The Grammar of Consciousness

An Exploration of Tacit Knowing

Edward Moss

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Preface

The purpose of this book is to present a set of ideas about the nature of mind and consciousness. This is much trampled ground, and ground moreover on which the various approaches of the psychologist, the philosopher, the cognitive scientist and the neuroscientist converge. I am in no position to survey all the relevant literature. My aim has been rather to relate my ideas to those of a few representative thinkers, and to consider three or four of them in detail as a background to the presentation of my own thesis.

The first chapter of the essay gives an account of relevant aspects of Michael Polanyi's theory of tacit knowing. I have come to know Polanyi's work in some depth only comparatively recently; but I am much impressed with its importance. I propose to take his theory as providing not only an effective way into the subject, but also a broad framework of understanding within which many other ideas can appropriately find their place. In the second chapter I relate this account to some ideas of my own about the nature of conceptual forms and the way in which they are stored and evoked in the mind. The third chapter develops on this basis an understanding of Polanyi's theory of tacit integration as a grammatical process, and of grammar itself as the rules of the structuring of consciousness. The fourth deals with purposive thinking and the categories of knowledge; and it also includes a discussion of Richard Rorty's views on predication. Throughout this discussion I am not trying to alter the general frame of Polanyi's thought; I am trying rather to bring a new psychological detail and precision to certain areas where Polanyi's treatment remains at a relatively high level of generalization.

The resulting account of the nature, function and processes of consciousness remains at some distance from the models emerging from the work of modern cognitive scientists and neuroscientists. These are areas in which a great deal of work is currently in progress and many striking advances have been made. Accordingly in my fifth chapter I consider in some detail the model, based on the analogy of the digital computer, which is developed in Daniel Dennett's book *Consciousness Explained*. Inevitably there are differences of view among the many scientists and philosophers working

in cognitive science, but Dennett's accomplished and comprehensive book seems to me to bring out in a helpful way the main issues that have to be faced.

In the sixth chapter I carry the debate further and suggest reasons why in my view the reductionist approach of Dennett and many others is radically insufficient to account for consciousness. In the process I continue the elaboration in certain respects of my own theory. In the seventh chapter I turn to the ideas of the neuroscientist Gerald Edelman, as expressed in his book *Bright Air, Brilliant Fire: On the Matter of the Mind.* Edelman, a very distinguished experimental scientist, is much less of a reductionist than Dennett, and firmly rejects the computer analogy. In the eighth chapter, 'Reflections on Edelman', I consider in some detail the possibility of bringing together my own top-down psychological theory of the grammar of consciousness with Edelman's bottom-up neurological theory of neuronal group selection, to build a coherent whole.

Inevitably any debate about the nature and processes of consciousness brings up fundamental issues of epistemology; and in the ninth chapter I turn to these issues directly. I consider briefly John C. Puddefoot's exegesis of Polanyi's view on realism and Rom Harré's account of 'referential realism', related to the views of Niels Bohr, indicating that there are important affinities here between Harré and Polanyi. This discussion of realism is linked to a consideration of the inescapability of some element of relativism as the most characteristic feature of the postmodern view of the world. Finally in the tenth chapter, I draw some further conclusions of my own about our apprehension of reality, bringing out the central importance in all knowing of personal experience in the present moment.

For Polanyi's views I have drawn primarily on his book *Personal Knowledge* and on some of the later essays collected in *Knowing and Being*. For Dennett's views I have relied on his book *Consciousness Explained*; for Edelman's on his *Bright Air, Brilliant Fire*; and for Harré's on his *Varieties of Realism*. In addition, where psychological theory is concerned, I have drawn on ideas more fully elaborated in my own book *Seeing Man Whole: A New Model for Psychology*.

I use the word 'grammar' in a precise and somewhat traditional way. My understanding of the nature of grammar is explained briefly in the Appendix on p. 148.

I should like to express my warm thanks for their help and encouragement to my friends and colleagues of *Convivium*, the United

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List of Abbreviations

BB Gerald Edelman, *Bright Air, Brilliant Fire: On the Matter of the Mind* (London: Allen Lane, The Penguin Press, 1992; New York: BasicBooks, 1992).

CE Daniel Dennett, *Consciousness Explained* (Boston, Mass.: Little, Brown, 1991; Harmondsworth: Penguin Books, 1993).

KB Michael Polanyi, *Knowing and Being* (London: Routledge and Kegan Paul, 1969).

PK Michael Polanyi, *Personal Knowledge* (London: Routledge and Kegan Paul, corrected edition 1962).

VR Rom Harré, *Varieties of Realism* (Oxford: Blackwell, 1986).

1

Some Aspects of Tacit Knowing

THE THEORY OF TACIT KNOWING

In this first chapter, my aim will be to give a short account of Michael Polanyi's theory of tacit knowing, as a basis for further exploration of the nature and structure of conscious experience. This theory, which lies at the core of Polanyi's philosophy, is built upon the recognition that our awareness always has a certain characteristic structure. When we are sharply aware of anything, whether through perception, imagination or abstract thought, we are aware of it as a whole, otherwise a 'comprehensive entity' or Gestalt. We know it *focally*. But we know it always in terms of the *coherence* of certain particulars which are known *subsidiarily*. Polanyi comes back to this point again and again, filling out its implications, with some variations of terminology, in many different writings and in a great variety of contexts. One of the most useful of these formulations, worked out in the essay 'Sense-Giving and Sense-Reading', is that of the *triad* of tacit knowing. This consists in the integration by a person A of subsidiary things B bearing on a focus C (*KB*, 182), a formulation which has the particular merit of emphasizing the active role of the person in performing the act of integration. Thinking, he says, has a *from–to* structure: 'in tacit knowing we always attend *from* the proximal *to* the distal term' (*KB*, 141). It seems to me beyond doubt that in identifying and concentrating upon this issue Polanyi has fastened on one of the central realities of human experience.

As Polanyi makes clear, the level of consciousness at which we are aware of subsidiary particulars may vary over the whole range of possible levels. Sometimes we are perfectly conscious, though in a subsidiary way, of what they are. We may indeed have become previously aware of each of them individually at the focus of consciousness before bringing them together in the *tacit integration* of a further

whole; for example, we may focus individually on each of a group of pieces in a jigsaw puzzle before we grasp how they can be put together in a whole. Sometimes, however, we have much less precise awareness of the subsidiary particulars. For example, when we read a sentence at normal speed, we have some awareness of the individual words, but it is an indeterminate sort of awareness. At other times again, as for example in visual perception, we may be totally unconscious of most of the clues which our minds are putting together subliminally in enabling us to grasp a perceived object.[1]

MEANING

Polanyi maintains that the structure of tacit knowing contains a general theory of meaning, one which also applies to language. Thus the meaning of the general motions which serve a cyclist in keeping his balance lies in the performance they jointly achieve. Thus a characteristic physiognomy is the meaning of its features. Thus the appearance of a perceived object with constant properties is the joint meaning of the clues of which the integration produces that appearance. This is what he regards as the *semantic function* of tacit knowing (*KB*, 145).

He goes on to make the point that 'in order to attend from X to its meaning, you must cease to look at X, and the moment you look at X you cease to see its meaning'. X in this context is any subsidiary particular to which you have given meaning by integrating it in a greater whole – for example a feature in a face or a note which you have recognized as part of a tune. Further,

> to attend *from* a thing *to* its meaning is to *interiorize* it, and ... to look instead *at* the thing is to *exteriorize* or *alienate* it.... *We endow a thing with meaning by interiorizing it and destroy its meaning by alienating it.*

If you listen to the note on its own, it loses its meaning within the tune.

In a later essay Polanyi also uses the terms 'sense-giving' and 'sense-deprivation' to describe these functions. In the context of my quotation above, having established the distinction, he takes it further in a way which carries important implications for his

understanding of language and of the relationship of the mind and body:

> Dwelling in our body clearly enables us to attend *from* it to things outside.... When we learn to use a language, or a probe, or a tool, and thus make ourselves aware of these things as we are of our body, we *interiorize* these things and *make ourselves dwell in them*.... We many be prepared to consider the act of comprehending a whole as an *interiorization of its parts*, which makes us dwell in the parts. (*KB*, 148)

Language provides a particularly clear example of what Polanyi means by 'indwelling'; for in using language to express an idea we are not paying attention to the words themselves; our attention is concentrated on the idea, the meaning; yet we cannot express – or in most cases even realize - the meaning unless we dwell in the language to do so; and when we dwell in a language in this way we are dwelling in our own memory and indirectly in the numberless experiences through which we learnt the language in the first place. When we dwell in something we take it for granted, as we concentrate on something else; yet we are at the same time crucially dependent on it to achieve the meaning we want to grasp.

This account of meaning may in one respect seem somewhat at odds with common sense. When the schoolmaster points to the broken window and says to the small boy with the catapult 'What is the meaning of this?', he knows perfectly well what a broken window is; in that sense he has not ceased to see the meaning of what he is looking at. But what has happened is that, having grasped the meaning or Gestalt of the broken window by integrating a variety of visual and other particulars in a whole, he is now looking for a wider whole, an explanation within which the first whole can be subsumed as a subsidiary particular. When he gets his explanation, the first whole acquires a new meaning as one of the features from which he attends to a wider story. It becomes one of the parts of the new story which are interiorized, and within which he dwells, as he makes sense of the whole. In the process the first meaning is 'alienated', it slips out of mind focally; but in a sense it is still there. Polanyi says of the first meaning, 'destruction is not always feasible and is hardly ever complete'; and indeed it becomes clear that destruction is not exactly the word he needs. In the essay 'Sense-Giving and Sense-Reading' he says:

> When we endow external objects with meaning, the process of integration assimilates them to our body, and to this extent *deprives them of their character as external objects*.... The meaningful use of a word, which causes it to lose its bodily character, makes us *look through the word at its meaning*. (*KB*, 184)

As this suggests, it may be more helpful to think of the meaning of a feature which has been interiorized as being made transparent (while still remaining influential) than to think of it as being destroyed.[2]

UNIVERSALS

In this passage I take it that by the 'bodily character' of a word Polanyi means its physical characteristics of sound or written appearance. But it is also, of course, possible in addition to distinguish the general meaning of a word when it is taken in isolation, its meaning as what Polanyi calls a 'general conception'. In his essay 'Tacit Knowing: Its Bearing on Some Problems of Philosophy' he approaches the problem of universals by way of the mind's capacity to make use of stereoscopic images. In this process perception, he says,

> resolves a contradiction by revaluing a *joint meaning* of conflicting clues in terms of a *new quality*. This is also what happens in the formation of a general conception. But ... compared with optical illusions or stereoscopic images, general conceptions are abstract, featureless. The focus in terms of which we are aware of the members of a class appears vague and almost empty.... As we move to a deeper, more comprehensive understanding of a human being, we tend to pass from more tangible particulars to increasingly intangible entities.... We know other minds, not by explicit inference, but by a tacit process of integration. This view restores the metaphysical notion of common sense, which speaks of things and a person's mind as distinct from the clues by which they happen to manifest themselves to the observer. And the same can be claimed for universals: they are the joint meaning of things forming a class. This meaning is something real. (*KB*, 168, 170)

In 'Personal Knowledge' Polanyi suggests that human beings have the capacity to conceive 'objective classifications'. These

classifications are based on three successively deeper strata of 'intensions': first readily specifiable properties which a class of things are known to share, 'apart from their common key feature'; secondly shared properties which are known but not readily specifiable – for example the unfathomable fund of shared connotations that can be stirred by words like justice or truth; and thirdly the indeterminate range of anticipations which a class of things may express, otherwise the possibilities it may evoke (*PK*, 112–17). 'Intensions' is a technical word which refers to the defining properties by which an object can be recognised as a member of the 'extension' of a term, in other words as belonging to a given class. Here it seems to refer to the subsidiary particulars of which we can become aware at varying levels of consciousness as we realize a concept at the focus of our attention. But Polanyi does not elucidate what these successively deeper levels of consciousness may be (a question to which I shall be returning on a later page). Nor does he say how we are to recognize the 'common key feature' of a class – though this may perhaps be identified with the 'joint meaning' and the 'new quality' to which he refers in the other passage quoted. Nor does he develop a theory of similarity, which seems to me an essential ingredient in any attempt to understand classification and universal terms. I think we should conclude that Polanyi's theory of general conceptions is inadequate as it stands. This is an area in which there is scope for further work.

ARTICULATION

Articulation, as Polanyi uses the word, consists in making explicit the particulars of what we know focally by giving them some form of symbolic representation, a term which in Polanyi's understanding includes spoken and written language, mathematics, graphs, maps, diagrams and pictures. By means of symbolic representation we produces a *text*, the distinguishing feature of which is that it represents and so *specifies* both the particulars of our experience and the way in which they are related together – what we might call the pattern of their integration.

Here, expanding a little on what Polanyi himself says, we may observe that symbolic representation always takes one of two forms. It may be *synchronic*, as with a map or diagram, in which

case the interrelationships of the particulars are shown simultaneously as spatial relations. Or it may be *serial*, as with codes or languages, in which case the particulars are specified in succession, together with *grammatical* indications of how they are to be put together again to form a whole. This seems to me a fairly straightforward observation; but it has far-reaching implications for the theory of language, and I shall return to these implications later. We may note that the succession in such a case is always temporal. In some situations, as in the case of written language, it may be set out spatially, and therefore synchronically, on the page; but it can only be read or written – and therefore understood – when translated into the form of a temporal succession.[3]

Articulation is essentially the servant of what Polanyi in *Personal Knowledge* calls the *meaning* or *sense* of what is articulated, otherwise the *conception* that it articulates. The usage varies as he tries to make himself clear in different contexts; but ultimately these three terms are for him virtually interchangeable. Some experiences are beyond precise articulation, particularly those of skills (like riding a bicycle), or of connoisseurship (like the capacity to recognize your own mackintosh at a glance). We can grasp them, but we cannot effectively say how they are made up, otherwise specify them; so Polanyi calls them variously *unspecifiable* or *ineffable* – which means, not that we cannot speak of them, but that we cannot analyze them in explicit detail. In the case of some other experiences, he says, the tacit is coextensive with the articulate text of which it is the meaning; which is to say that the text adequately expresses the meaning. In others still the two fall apart, either because the articulation is inept or because symbolic operations, particularly of a mathematical kind, can sometimes outrun our understanding (when they may be pointing to novel modes of thought) (*PK*, 87).

It can be helpful in understanding these distinctions to make use of Polanyi's account of sense-giving and sense-reading. If a man writes a letter to his wife, describing his impressions of a place that he has visited for the first time, he begins by a sense-reading, as he integrates scattered impressions into a coherent idea of what he has experienced. He continues by articulating his experience into words. This is a process of sense-giving, as he builds up an explicit text that generates a 'conception' matching the original idea he had in mind. Finally as his wife reads the letter, she in her turn, by a process of sense-reading, generates in her mind a conception that more or less matches his. As Polanyi points out (*KB*, 186), we have

here a sequence of three integrations, three triads of tacit knowing, through which meaning is achieved when a person dwells in a set of subsidiary particulars and brings them to a focus. The first integrations are performed by the man, the third by his wife.

It is important to bring out Polanyi's distinction between the man's two integrations. They produce two different versions of the same thing. The first is more of an immediate impression, what Vygotsky would call a 'spontaneous' idea,[4] in which few, if any, of the subsidiary particulars are separately identified and brought to a focus. The second is a conception generated from an explicit text, through which a large number of particulars are separately specified and articulated. It is not identical with the first, it is probably a good deal more elaborate; and the writer may well feel that the process of articulation has enabled him to hone his original conception to a sharper edge of truth. Yet the writer has constantly to appraise the articulated version by reference to the spontaneous one; indeed in practice they would seem to be developed alternately in a sort of dialectic.

If Keats had lived to 'trace with the magic hand of chance' those 'huge cloudy symbols of a high romance', which he beheld 'upon the night's starr'd face',[5] he would, in Polanyi's terms, have been articulating his initial sense-reading into a text; and in this process of sense-giving he would no doubt have changed and elaborated it; but the process would have been one of continual comparison and correction of the 'sense' given through the words with the 'sense' spontaneously read from the unspecifiable sensibility of his mind:

> The Pygmalion at work in us when we shape a conception is ever prepared to seek guidance from his own creation; and yet, in reliance on his contact with reality, is ready to re-shape his creation, even while he accepts its guidance (*PK*, 104)

Polanyi insists on a number of occasions (e.g. *PK*, 91) that 'we should accredit in ourselves the capacity for appraising our own articulation'; 'this capacity is not infallible', he adds, 'but we are competent to exercise it and must ultimately rely on our exercise of it'. As it seems to me, such an appraisal can only take the form of the comparison of two meanings, one articulated and one not; and it is important that the meaning in which we ultimately rely for our contact with reality, the one by which we ultimately rely for our contact with reality, the one by which the other is appraised, is the

inarticulate or 'spontaneous' version. It is tempting to say that the explicit has to be appraised by reference to the tacit; but this would not be quite accurate, because even a meaning reached through an articulated text is ultimately a case of tacit knowing:

> The formalization of meaning relies therefore *from the start* on the practice of unformalized meaning. It necessarily also does so *in the end*, when we are using the undefined words of the definitions. (*PK*, 250)

> *All knowledge falls into one of these two classes: it is either tacit or rooted in tacit knowledge* [as one might say, either unspecified tacit knowing or specified tacit knowing]. The idea of strictly explicit knowledge is indeed self-contradictory; deprived of their tacit coefficients, all spoken words, all formulae, all maps and graphs, are strictly meaningless. (*KB*, 195)

Even an explicit text has to be interiorized, lost sight of, made transparent, before it can be understood, before it can yield its focal, tacit meaning. But that meaning is then one that grows out of the interiorization of all the particulars which have been explicitly articulated; it has to make a coherent whole of them all, and thus enable each of them to contribute its coefficient of tacit meaning. As this indicates, the tacit meaning, or, as Polanyi sometimes puts it, the tacit component, emerges at both the focal and the subsidiary level.

Polanyi's choice of the word 'tacit' may sometimes be misunderstood, since for many people it tends to carry an implication of vagueness, of something not quite at the focus of consciousness. In fact the focus can be relatively sharp or relatively soft, according to the situation; but this is a different matter from whether the meaning conveyed is tacit or explicit. I have compared Polanyi's use of 'tacit' to Vygotsky's use of 'spontaneous' for a cognate, though not identical, idea. Vygotsky contrasts 'spontaneous' ideas with 'scientific' ideas, of which the essential characteristic is that they are placed within a hierarchy of superordinate and subordinate ideas, so that we feel we have them explicitly under control. If we know how something is made up and how it fits in, our understanding has a firmer grip upon it. This does not mean however that we become more focally conscious of it. Vygotsky's distinction

corresponds to the Polanyian distinction between cases in which the subsidiary particulars are unspecified (or even unspecifiable, 'ineffable') and cases in which we can be specifically aware of them – that is, between 'unformalized' and 'formalized' meaning, between the tacit and the explicit. Elsewhere I have used the terms 'indeterminate' and 'determinate' knowledge to make this distinction. Polanyi himself does not suggest that our explicit understanding is further strengthened when we are able to recognize the focal idea in its turn as a subsidiary particular serving a wider, superordinate idea, but this useful thought from Vygotsky can well be accommodated within his system.

However that may be, the crucial point to be emphasized in regard to Polanyi's own theory is that to grasp even a formalized meaning requires a process of integration to a focus, which is a process of *tacit* knowing. He speaks of the 'process by which the tacit cooperates with the explicit, the personal with the formal' (*PK*, 87). But there is always remains the gap between the articulate and the tacit (*PK*, 94):

> Thus to speak a language is to commit ourselves to the double indeterminacy due to our reliance both on its formalism and on our own continued reconsideration of this formalism in its bearing on experience. For just as, owing to the ultimately tacit character of all our knowledge, we remain ever unable to say all that we know, so also, in view of the character of meaning, we can never quite know what is implied in what we say. (*PK*, 95)

LANGUAGE

'To use language', Polanyi says, 'is a performance of the same kind as our integration of visual clues for perceiving an object ... or our integration of muscular contractions in walking or driving a motor car' (*KB*, 193). Individual words acquire their meaning for us through a tacit integration in which we rely on a subsidiary awareness of the word for directing our attention to its meaning. Furthermore 'the adaptation of our conceptions and of the corresponding use of language to new things ... is [also] achieved subsidiarily, while our attention is focused on making sense of the

situation in front of us'. 'Languages are the product of man's groping for words in the process of making new conceptual decisions, to be conveyed by words' (*PK*, 112). But the meaning of an individual word, established, generalized and adapted through many experiences of its use, is a ' general conception', otherwise an 'objective classification'. The vocabulary of our language, by defining a large number of such 'natural classes', builds up a theory of the universe (*PK*, 80). (I would prefer to say a theory of how to divide up and classify the bits of the universe that we encounter; but that is hardly more than an issue of terminology.) Different languages sustain alternative conceptual frameworks, interpreting all that can be talked about in terms of somewhat differing recurrent features.

Polanyi draws a parallel between the way in which we learn, in common with the higher animals, to establish from a variety of perceptual clues the *constancy* of the objects we perceive, and the way in which we learn to establish the *consistency* of the meaning of words, as we 'shape' their meaning 'in the lifelong course of applying them to a long series of identifiable instances' (*PK*, 97). The size of any useful vocabulary is restricted by the need to learn meanings in this way and by the limitations of human memory. Consequently we have to be able to combine words to build up more specific meanings; and this is the function of *grammar*.

The link between text and meaning is asymmetrical. The correct use of medical terms cannot be achieved without a knowledge of medicine; but a great deal of medicine can be remembered even after one has forgotten the use of medical terms. This brings out the important point that 'knowledge, even when acquired verbally, has a 'latent' character; to express it in words is a performance based on our possession of such latent knowledge' (*PK*, 102). Mastery of a subject is akin to knowing one's way about a complex topography, though it can be supplemented by knowledge of linguistic and other pointers which give us access to knowledge stored in many forms. Education is latent knowledge of linguistic and other pointers which give us access to knowledge, of which we are aware subsidiarily through a certain sense of intellectual power. (He is referring here to education as an achievement or possession rather than to the educational process itself.) To this I would only wish, at the present stage, to add that latent knowledge is always knowledge stored in a synchronic form, which has to be incorporated in some form of diachronic articulation, an articulation in time, before we can make use of it in conscious thought.

In 'Sense-Giving and Sense-Reading' and in his book *The Tacit Dimension* Polanyi makes a number of references to the theories of Noam Chomsky. (These are usefully reviewed in an article by Sara Leopold from 'Tradition and Discovery', reproduced in *Convivium* no. 25 of October 1985.) He welcomes 'a distinct tendency' in Chomsky to break with strict empiricism and to recognize the mental character of meaning; and he suggests that his own work supports this view by showing that speech has the fundamental structure of all meaningful uses of consciousness in animals and men (an extremely important contention in my view, but hardly one which Chomsky would support). He refers to Chomsky's view that the *faculté de langage* is only one of the faculties of the mind, but does so only to express his own view that language is a tacit performance. He refers to a problem raised by Chomsky about the nature of the innate structure which enables a child to learn to speak, but only to point out that according to the dynamics of tacit knowing the rules of language are acquired subsidiarily without being recognized at the focus of attention. We are left with the impression of two thinkers facing in somewhat different directions and effectively passing each other by. Polanyi was clearly looking for support for his own ideas in Chomsky's new theories of linguistics; but there was only limited and ambiguous support to be found. In practice neither engaged closely with the arguments of the other.

In his own analysis of language Polanyi developed some important insights and established a general approach to the nature and use of language which I find entirely convincing. But it is all done with a broad brush so far as linguistic theory and its underlying psychology are concerned, and consequently it leaves a good deal of room for consolidation in detail. It is not surprising that he looked for an ally in Chomsky. It in so far as Chomsky was not a behaviourist, and in so far as he postulated a universal mechanism underlying all use of language (harking back to the seventeenth-century 'general grammar' of Port-Royal), he could be reckoned to be on the same side of the fence as Polanyi. But his approach to semantics is curiously indefinite and unsatisfactory, he does not recognize a system of tacit knowing separable from our use of language but underlying it, and he does not accept that we share such 'uses of consciousness' with the higher animals. Ultimately he is wedded to a serial, diachronic view of the generation of language which leaves little space for the synchronic Gestalt which Polanyian

terms is the focal meaning served by the articulation of ideas in words. As I see it, Polanyi's own view of language, though in some respects not fully developed, is far sounder and more comprehensive than Chomsky's, not least because it is integrated with a convincing theory of thought and meaning. To use one of Chomsky's own favourite expressions, it has far greater explanatory power.

TRUTH AND REALITY

'Truth', said Polanyi, 'lies in the achievement of a contact with reality' (*PK*, 147). And reality is 'that which may yet inexhaustibly manifest itself', a definition which implies 'the presence of an *indeterminate* range of *anticipations* in any knowledge bearing on reality' (*KB*, 141). This suggests a certain lack of finality in any knowledge that we may achieve about the world, which grows out of the fact that for Polanyi 'all truth is but the external pole of belief' (*PK*, 286). It involves a personal commitment. 'The personal comes into being by asserting universal intent, and the universal is constituted by being accepted as the impersonal term of this personal commitment.' Furthermore the personal assertion of truth involves personal responsibility. 'While compulsion by force or neurotic obsession excludes responsibility, compulsion by universal intent establishes responsibility' (*PK*, 309). Polanyi rejects the whole Cartesian and post-Cartesian tradition of critical philosophy, rooted in the assumption that objective knowledge can be achieved through a process of systematic doubting and testing; and this follows from his fundamental insight concerning the nature of the process of knowing. It always involves the tacit integration of particulars, subsidiarily known, to a focus of meaning which is itself an object of tacit knowing. 'The idea of strictly explicit knowledge is self-contradictory.'

Polanyi's epistemology has been much discussed. There is much more to it than I have mentioned here, not least the theory developed in the essays 'The Structure of Consciousness' and Life's Irreducible Structure' that living creatures consist of a hierarchy of levels of being, each having its own structural principles and organizing fields. But I do not intend to go into it more deeply at this point. In the next three chapters my intention will be to suggest the outline of a much more precise and elaborated account of the

psychological and grammatical processes of consciousness than Polanyi himself ever offered. Far from undermining Polanyi's system of thought, I believe this will provide it with some useful underpinning and reinforcement. In the process, however, it will bring some features of the system, including some of its epistemological features, into a somewhat new perspective.

Polanyi's work offers a multitude of endlessly subtle and resourceful descriptions, in many different contexts, of the processes and implications of tacit integration and personal knowledge, perhaps most strikingly in his analysis of scientific thinking and scientific discovery. Yet it could be said that he never analyzed in close detail the process (which I believe is a grammatical process) whereby the particulars of consciousness are integrated or 'merged' in a whole; nor the mechanisms of the different levels of consciousness involved. Furthermore, although he has some useful things to say about the purposive tensions involved in problem-solving, his focus is essentially on cognitive processes. He has little to say about the nature of the personality involved in personal knowing. He hardly touches upon the ways in which living beings establish their purposes, take their decisions and so act out the continual process of adaptation to the exigencies of life in the world. To some extent this may have been due to an over-hasty identification of cybernetics with philosophical objectivism, and a consequent reluctance to explore the possible relevance to his work of the theory of self-regulating systems. To say these things, however, is hardly to criticize Polanyi. It is rather to suggest that his work leads on to other work. It meets his own criterion of truth, namely the capacity to manifest itself inexhaustibly in an indeterminate range of anticipations bearing upon reality.

2

Conceptual Forms

THE SHAPING OF CONCEPTIONS

For Polanyi the meaning of a whole is what makes it a whole, it is that of which we can become focally aware. It is a conception, it is the tacit component, it is the sense of a whole, it is a comprehensive entity, a significant shape, a Gestalt. The fact that there are many words for it reflects the fact that it is never precisely pinned down since, of its nature, it is *tacit*. It cannot be identified with its articulation, or text, even when it is possible to articulate it fully, so that the tacit whole is coextensive with the text (*PK*, 87). Similarly it is impossible to pin down separately the meaning of a subsidiary particular, since this reflects its participation in sustaining a whole (*PK*, 58). 'To take cognizance focally of a subsidiary element of a comprehension is a new experience' (*PK*, 115). The formalization of meaning, as in a definition, not only depends on the unformalized meaning of the whole, but also, at the other end, on the unformalized meaning of the undefined words of the definition. Thus definitions 'only shift the tacit coefficient of meaning; they reduce it but cannot eliminate it' (*PK*, 250).

The capacity for articulation has immense cumulative importance. Polanyi attributes to it the entire intellectual superiority of humans over animals. But it is always the servant of the tacit component, never even a partial substitute for it. It makes its contribution dialectically, by way of an alternation between the intuitive and the formal, as when a mathematician makes progress by shifting his confidence from intuition to computation and back again. But, as Polanyi makes clear, 'this alternation is asymmetrical, for a formal step can be valid only by virtue of our tacit confirmation of it' (*PK*, 131).

I fully accept this account of meaning in the cognitive context. But I question whether it is necessary to be so indeterminate about what sort of thing the object of our focal attention is. Polanyi talks of 'shaping' our conceptions. He applies the word 'outline' to the

whole of which we become focally aware in understanding a mathematical proof (*PK*, 119). One of the roots of his theory lies in Gestalt psychology, and the German word 'Gestalt' is translated 'form, shape, figure'. We talk naturally of 'grasping' or 'comprehending' a meaning. Could Polanyi not have said straightforwardly that a meaning or conception *is* some kind of form or shape? He chose not to do so in so many words, though he often came near to it, as in his references to 'significant shapes' in the essay 'The Unaccountable Element in Science' (*KB*, 108). He spoke of formalization, but he seems to have generally avoided speaking of individual forms – or of ideas, the equivalent word derived from the Greek. In this he is like many modern philosophers and scientists. The reason is no doubt, at least in part, a desire to avoid the confusion which might be caused by the use of a word with a long and confusing philosophical history, carrying associations from Plato, Aristotle, Aquinas and many others. But a weightier reason might be the difficulty of dealing with the shifting and elusive nature of ideas, which do not seem to have precise forms, but often seem rather to yield different meanings in different circumstances. It is my view that this difficulty can be overcome, and that in the process of overcoming it we can achieve a considerable clarification of the way in which we experience and understand the world.

FORMS

Wittgenstein's approach to this problem in his later writing was by way of 'language games' and 'families of ideas'. The post-structuralists and deconstructionists in France also put language, the 'text', at the centre of their concern, but only, in somewhat desperate fashion, to deny the possibility of attributing any real meaning to it. For them, as George Steiner has said, 'all readings are misreadings and the sign has no underwritten intelligibility'.[1] My conviction, however, is that we have to begin, not from language, but from an understanding of what happens in consciousness Here Now. Language, as I see it, reflects the structure of consciousness, not vice-versa. Human knowledge is always personal knowledge, as Polanyi saw, and can only be expressed in terms that are liable to vary from person to person and from language to language; but

human persons can nevertheless through consciousness achieve some contact with reality and truth. Polanyi's theory of tacit knowing grows out of that fact.

In Chapters 9 and 10 of this book I shall be looking at some of the epistemological issues that these suggestions bring up. But at this point I stay with the question of whether, and how far, we can say that a meaning, as Polanyi uses the word, is a kind of form. Let us take as an example what Berkeley calls 'the general inconsistent idea of a triangle'. My suggestion is that such an idea, which Polanyi would call a general conception, should be described as a form – but a *conceptual* form, distinguished from a *perceptual* form, such as an actual triangle, because it is not clear-cut, it reflects a potential, a range of possibility, a warp of probability. I note in this connexion that such systems can sometimes be represented, if my understanding is correct, by the remarkable, multi-dimensional, topological graphs of catastrophe theorists. On these graphs a particular instance or realization of the system in represented by a point located on the convoluted surface of the graph. René Thom, the originator of catastrophe theory, is stated to hold that 'our concepts are mathematical models, topological maps of the objects and processes that inspire them'.[2]

The essential functional characteristic of an idea or conceptual form (and I propose to treat the two as synonymous) is that it establishes a classification which divides all possibilities into two groups – positive or negative, instances or non-instances of the class. I shall return to that point shortly. But if we are to investigate more closely the nature of conceptual forms, we have to begin by considering what we mean by *perceptual* forms in our ordinary usage. The distinctive character of a form, whether it be that of a tree, or a melodic phrase or the red cross marked on an ambulance, would seem to be that it is a single, undivided value in a single undivided space, but a value which somehow unites other values that can be separately identified in each of the dimensions of the space (time and pitch, for example, in the case of the tune). The single or focal value – the shape of a graph, for example – is primary; while the others – the coordinates in two dimensions, for example, from which the graph is constructed – are subsidiary values at a lower level of hierarchy. A ball-bearing is a single indivisible form, but it unifies a potentially infinite number of points on its surface, located in three dimensions. The same could be said of the shape of an oak leaf. In the case of the oak leaf the form-as-a-whole could also be

said to be built up from a number of sub-forms, such as curves, corners and surfaces, while these in turn are single, undivided values unifying points located in different dimensions. (In fact a similar analysis into constituent segments, though harder to imagine, could also be applied to the ball-bearing.)

When we recognize a form, we may be quite unaware of the subsidiary forms or subsidiary one-dimensional values which it is possible to identify in this way. On analysis, however, they can be seen to be there, and to be articulated together in such a way as to build up the form-as-a-whole. Yet there is always a gap, as Polanyi saw, between the articulated subsidiaries – which he called the text – and the simultaneous conception, Gestalt or form which we create from them (or from which we may, in some circumstances, derive them).

We can perceive the same form through different sensory channels – through sight and touch, for example – but every basic kind of form is related to a corresponding kind of space. We perceive lines, whether straight or curved or complex, in a two-dimensional space. We perceive three-dimensional shapes in a three-dimensional space. Trajectories we do not actually perceive, but by analogy we do recognize them as forms (as any artillery manual will demonstrate), and we do so in what might be called an analogical four-dimensional space in which one of the dimensions is time. We recognize melodic forms, otherwise tunes, as already noted, in a melodic space, again analogical, of which one dimension is time and one is pitch. In such an analogical space, in which time is one of the dimensions, the temporal dimension represents what one might described as a synchronic span of time, extracted from the diachronic flow. For any form, including a tune or a movement or the trajectory of a bird across the sky, has to be grasped as a simultaneous whole, even if it is subsequently analysed either into shorter forms or into one-dimensional coordinate values. Similarly, as we have already seen, smaller forms, recognized one by one, can in some circumstances be juxtaposed to build up a larger form of the same type, which can then be recognized as a whole.

What I am now suggesting is that in an analogous fashion we recognize conceptual forms in a conceptual space. The main characteristics of this space are that it is *metaphorical*, *quasi-topological*, and entirely *non-perceptual*, so that within it any particular form can express a range of potentiality rather than a clear-cut actuality. It is a vague metaphor of three-dimensional space, much as four-dimensional space of trajectories is a metaphor, and it can allow

expression in a broad way to spatio-temporal relationships. There is an interesting correspondence here with the topological brain maps described by Gerald Edelman and discussed in Chapter 7 below.[3]

The flexible, quasi-topological, conceptual forms have a significantly different role from that of perceptual forms, one which is closely involved with consciousness and the passing of information. Communication technologists tell us that information passes when a limited range of possibility is resolved into actuality.[4] If the number of possibilities can be specified, we can work out the number of 'bits' of information involved. Now it seems to be the case that we cannot consciously and focally see anything, or feel or taste or smell anything, without at the same time *thinking* it. Even if all we are conscious of is an indefinable smell, a patch of colour, or an indeterminate sound, we locate it, focus on it and classify it in that very general way, as we become aware of it. (This assertion can be tested out introspectively.) It is certainly possible for us to react to sensory information unconsciously, in a reflex manner, as, for example, with eye-blinking or various digestive processes. But in such cases the possibilities and responses are predetermined by the structure of the organism – just as the temperature possibilities of which the thermostat on a hot water boiler can take cognizance are built into its mechanism, together with the appropriate responses. My argument is that in true perception, where consciousness is involved, an *ad hoc* range of possibility established by a conceptual form is resolved into actuality by the perceptual forms, qualities and intensities which are projected upon it and so resolve its ambiguity. The metric or other space of perception is projected upon the quasi-topological space of thought. Information is passed. We are conscious of what we perceive.

Correspondingly when the actuality of which we become aware is itself an idea (a conceptual form), rather than a perception, what happens is that one idea is projected upon another, and is thus recognized as an instance of the other, more general idea. If I think of the idea of a motor car in general, as distinct from a particular car, this idea emerges against the background, usually subconscious, of a wider meta-classification such as that of 'vehicle'. This is the interesting process which Gregory Bateson has called 'logical typing'.

It is important that the everyday process of living involves a constant anticipation of the future, which comes towards us as a range of potentiality, constantly resolved into actuality and constantly

passing into history, as time flows through us and beyond us. This can suggest why a mechanism of the kind I have described would have evolutionary survival value. It can also suggest how it is that we seem to have conceptual matrices ready and waiting for the interpretation of our perceptual experience, even if they are sometimes of the vaguest and most general kind, and even if sometimes, when we are taken by surprise or woken out of sleep, we may need a moment or two to mobilize them, and so to become fully conscious of what is going on. These matrix forms correspond to what Piaget and others call schemata and George Kelly calls 'templets' [*sic*]. Polanyi adopts Piaget's use of the term 'assimilation' for 'the subsumption of a new instance under a previously accepted conception' and uses 'adaptation' (Piaget's term is 'accommodation') for 'the formation of new or modified conceptions' to deal with 'novel experience' (*PK*, 105).

GENERALIZATION

These suggestions bring us up at once against the problem of how you decide what instance is to be subsumed under what schema, the problem of what Polanyi called 'objective classifications'. In 'Personal Knowledge' he refers to the linguistic philosopher F.Waismann's theory that general terms have an 'open texture', and makes the criticism that such 'open' terms can have no meaning at all unless there is some controlling principle to limit the range of their meaning. He himself finds such a controlling principle in his willingness to accredit the speaker's sense of fitness for judging that his words express the reality he seeks to express. But that only pushes the problem back one stage. How does the speaker make this judgment? Rightly, I believe, Polanyi rejects the idea that a sufficient answer can be found through the study of linguistic usage. 'These controversial questions', he says, 'can be attended to only if we use language as it exists to direct our attention to its subject matter, and not the other way round, selecting instances of relevant cases to direct our attention to our use of language' (*PK*, 114). But, as I have already made clear in the preceding chapter, it seems to me that his own solution is far from clear or fully convincing. It is based on three strata of 'intensions', which are shared properties or anticipations, combined with a 'new quality'

or 'common key feature' for each conception. This new quality, which reflects the joint meaning of the clues that are to be integrated, is, he says, relatively abstract and featureless in the case of general ideas, by comparison with perceptions. But what is it? I do not think Polanyi has a good reply to that question. Furthermore I have the impression that in speaking of shared properties, he is, somewhat unwillingly, relying on the process of abstraction (defined by Locke as 'leaving out the particulars wherein they differ') as the basis for classification; whereas my own belief is that the true basis is to be found in *generalization*.

What is the difference? This is a crucial question, but it is far from easy to answer. Vygotsky distinguishes the two without making the distinction between them very clear. In concept formation, he says, it is necessary 'to abstract, to single out' elements; but later he says that it is not a process in which images are superimposed in such a way that some traits are intensified, while others are cancelled out; 'concept formation appears as a *movement* within the pyramid of concepts, constantly alternating between two directions from the particular to the general and from the general to the particular'.[5] This does not seem to me a fully satisfactory account either. But I think it can be useful to seize upon the image of a pyramid or cone of generalization, on the top of which sits the 'controlling principle', the 'common key feature', the somewhat abstract and featureless 'new quality' which marks out this particular objective classification. I call it a paradigm form.

I would define generalization as the re-expression of a form on a register of coarser grain; thus the outline of a distant hill is more generalized on a misty day than on a clear day, but it remains a different expression of the same thing. A class consists of all those forms which on generalization to a sufficient degree, coincide with a given, highly general paradigm form. We can therefore speak of a cone of generalization culminating in a paradigm, and of the axis of generalization established by such a cone. Every class divides the world in two, since it constitutes a register affording two possible values: within the cone or outside it, instance or non-instance. But how does generalization so defined differ from abstraction? The answer, I believe, is that in Polanyian terms generalization is a tacit, spontaneous procedure, whereas abstraction is an articulate, step by step procedure. Both take place over time. The relation between

them is Polanyi's relationship between 'conception' and text, between unformalized and formalized meaning. I have not so far, in giving my definition of generalization, been able to find a better word than 'grain'; but I would prefer to avoid it, since it tends to suggest discrete bits of possibility organized together, whereas what I have in mind is an undivided form – the way we see the distant hill on this misty day – which is at the same time a different form from that which we see on a clear day, yet *similar* to it.

SIMILARITY

The mind has an amazing capacity to recognize similarity at a glance; and this includes conceptual as well as perceptual similarity. This is the obverse of its instant capacity to generalize, to recognize relationships of generalization and particularization, and so to establish classifications as in effect cones of generalization culminating in paradigm forms, In each case the paradigm form represents the 'controlling principle' in the sense that there can be no further generalization beyond it, within this particular cone. Whenever we recognize similarity – in other words whenever we recognize anything – we are making use of this power of generalization. It is an inarticulate capacity, therefore, which we share with many animals. But what has made possible the remarkably complex human development of conceptual thought has been our capacity to make the process articulate – essentially by using words, or other symbols, to label particular general conceptions, so that they can be not only remembered, but retrieved from memory and communicated. Yet in this, as in all other contexts, we have to bear in mind that, as Polanyi said, it is the tacit which validates the articulate, not vice-versa.

An important implication of the capacity to recognize similarity is that it enables us, over and above our recognition of spatio-temporal relationships, to identify a number of logical relationships between ideas, in particular relationships of positive and negative classification. This is a point to which I will return in a later chapter, in which I deal with the grammatical integration of ideas in predicative structures.

STORED IDEAS

Polanyi emphasizes the way in which the potential meaning of a word is modified every time it is used. He talks about the way in which we shape the meaning of words in the lifelong course of applying them to identifiable instances. But I do not think he tackles or even identifies the problem of distinguishing between the range of potential meaning so created and the much more restricted meaning evoked on a particular occasion. On my account this is the distinction between the *stored idea complex*, which is embedded in some way in what I call the mind-manifold, and the *evoked idea* which emerges in present consciousness.

I think of the mind-manifold, or memory store, itself as an immense terrain shaped by the impact of the experience of a lifetime. Its identifiable main features, the idea complexes, are themselves agglomerations of lesser features brought together either by contiguity in space-time or by the unifying power of generalizing classifications. It is thus ordered in two ways: as an immense, flexible map extended in space and time, the world and history, on which any thing or event can be located in relation to any other, or to Me Here Now; and as a repertoire of general ideas identified by markers drawn from all the signs, codes and languages with which the individual is familiar. Forms derived from our conscious experience float down, as it were, to the reefs of memory below, settling as accretions where they find affinity through space-time location or through similarities, and modifying as they do so the accumulated fixations that build up the features of the manifold. If we were to look for a physical analogy for the nature of these fixations we could perhaps turn to holography.

On the flexible space-time map I can instantaneously relate the table in front of me to the chair on which I am sitting, to a distant star, to the Summer Palace in Peking, or to William the Conqueror's fleet sailing across the English Channel in AD 1066: distances in time or space are indefinitely flexible, but sequence and exclusion in given dimensions are established. Similarly I can draw at will on any idea in my basic repertoire, provided I can identify it through some known marker, usually a word. But the capacity of memory to bring up ready-made general ideas tends to be limited by the size of the vocabulary of words and other forms of symbolic representation that I can keep in mind, and so refer to instantly.

This dual ordering provides a basis for the remembering and retrieval, and consequently the manipulation and articulation, of ideas. An idea with a space-time location on the map has an *existential* meaning, to use one of Polanyi's distinctions (though not perhaps exactly as he would have used it), while an idea without such a location has a *denotative* meaning only. As our previous argument would suggest, it is not possible to remember in imagination a thing or event on the map without also thinking it, projecting it upon an idea in such a way that information can be passed. The two orderings of memory are thus closely interlinked. It is indeed conceivable that they are related respectively to the right and left hemispheres of the brain. There is a relevant discussion of experimental work by Gazzaniga and others on cooperation between the hemispheres in R. A. Hodgkin's 'Playing and Discovery'.[6]

EVOKED IDEAS

How, then, can ideas be evoked from the stored idea complexes which are features of the mind-manifold? My suggestion is that they are evoked by a process akin to resonance, whereby forms recognized in the immediate Here Now resonate with similar forms across the manifold. This suggestion can be illustrated by reference to the innumerable ways in which a given body, say a bell, can be struck, and the infinite variety of shapes produced by the ensuing vibration. (I owe the comparison to Erwin Schrödinger.[7]) In spite of this variety the actual motion can be mathematically analysed as a superposition of a discrete series of comparatively simple 'proper vibrations'. The unique form of the sound wave produced on a particular occasion corresponds to the evoked idea, while the body itself corresponds to the stored idea complex. The proper vibrations correspond to the terms which, on analysis, may be extracted to form a definition.

As with a map, it depends somewhat on the scale you are using and the purpose you have in mind exactly what agglomerations are picked out by the resonance (whether the mountain as a whole, for instance, or the glacier on its face). And it depends still more on the actual context what precise form the evoked idea will take on a particular occasion. When a form is evoked from the manifold in this

way, other forms closely associated with it by previous contiguity or by similarity may also be stimulated into resonance. The actual thresholds of stimulation vary for different forms and on different occasions: for example, if you are hungry, ideas connected with food will come especially easily to mind.

If this were all, the resonance of experience across the mind-manifold would produce a sort of confused, undifferentiated roar, as innumerable idea forms were summoned simultaneously into consciousness. But just as perception involves a complex process of selection and ordering prior to consciousness, as Polanyi realized, so too does thought. Here the Polanyian concept of focal and subsidiary knowledge is highly relevant. In visual perception the cone of attention is orientated in a particular direction and focussed at a particular level of generalization. If you are looking at the tree you will not notice the ant climbing up one of its leaves. Our conscious attention, whether we are just looking or thinking abstract thoughts, is orientated in a particular direction by the threshold settings of the mind-manifold, working within what I call the purposive cycles of the mind. The whole process of selection and ordering through which we become aware of the world, and our own feelings and intentions within it, is essentially the process which Polanyi described as tacit integration. It is the operation of the grammar of consciousness.

In this chapter, by building up a speculative model, I have tried to clarify the nature of the entities – the meanings, conceptions, particulars and so on – which are integrated in this process. In the next chapter, building upon this foundation, I will attempt to model the rules and processes of tacit integration – the grammatical rules of the structuring of conscious life.

3

Tacit Integration as a Grammatical Process

INTEGRATION AND GRAMMAR

Polanyi did not discuss in detail, in any writings of which I am aware, the temporal span of individual acts of tacit integration or the succession of such acts in time. But these are issues which come into view as soon as the process of tacit integration is considered as an aspect of the individual's stream of consciousness.

Many of the comprehensive entities of which Polanyi gives examples, particularly when he is speaking of skills such as riding a bicycle or using a tool, represent processes or sequences in time; they are comparable to the 'sensori-motor schemata' of Piaget. But, as recognized, they are synchronic wholes. Conversely many comprehensive entities, such as the topographical meaning of 'how to get there' which we extract from a map, or the shape we can identify with the aid of a probe, or the insight with which we grasp a mathematical proof, are of their nature synchronic or instantaneous wholes; yet it still takes time – and taking cognizance of subsidiary particulars – if we are to grasp them. As Polanyi himself said, there is a close analogy between the elucidation of a complex object and the mastering of a skill.

The immediate conclusion which I believe we have to draw is that every span of consciousness involves the recognition of a synchronic whole over what Daniel Dennett calls a smear of time. This applies even to patterns which are themselves extended in time (which may then be recognized in an extracted, synchronic dimension of time). But the next conclusion to which we are drawn relates to the *structure* of that *coherence* among subsidiary particulars which Polanyi identifies as central to tacit knowing. It is, I suggest, a hierarchical structure, which has at its apex a *diachronic* transition between a *synchronic* subject and predicate, that are finally unified in a *synchronic* whole as the integration is completed. And the

nature of the structure, as I would understand it, is grammatical. (See the Appendix: 'A Note on Grammar' on p. 148.)

Our consciousness is never simple; it is always a consciousness of things or ideas in relation. In Chapter 2 I have discussed those relationships between things or ideas which we can categorize as spatio-temporal or logical. But it is also necessary to take into account a third class of relationships, those which can be described as grammatical. While we recognize spatio-temporal and logical relationships as existing 'out there', in the world or in the resonance of the mind, grammatical relationships, as I interpret them, are those which we superimpose on the other relationships in the process of selecting and ordering – or, to use an old and precise word, construing – them into the realizations of conscious life. They are relationships of *syntax*. But grammar consists of more than syntax. We also superimpose on the things or ideas themselves certain roles which help to determine how they are to be fitted together syntactically. These are the roles of *accidence*, of which the most important, for reasons which I shall explain, are those of subject and predicate.

It will be evident that my conception of grammar is essentially of the traditional, or 'pedagogical' kind. I think unashamedly in terms of the sort of grammar we might actually have used in learning French or German at school, not in terms of the Chomskian type of generative–transformational grammar, which is in my view much less closely related to the way the mind works. But I extend the application of the word in an important way, since I believe that it should be applied to perception and thought as well as language – in fact to all the processes of consciousness. My suggestion is that grammar can properly be defined as the rules of the structuring of consciousness; and consequently that it is identical with the rules of tacit integration. The grammar of any actual language is itself a particular application of the general rules of grammar, one which is inevitably complicated by the need to express, through a temporal sequence of words, a set of ideas which are eventually to be recognized in synchronic relationship with each other, as they build up the meaning of the sentence as a 'comprehensive entity'.

THE WALKING MOTION OF CONSCIOUSNESS

To go back a step, the things or ideas which are identified as subsidiary particulars in a tacit integration are themselves *synchronic*

wholes recognized in a space, whether perceptual or conceptual; and within every span of consciousness Now there is a transition in the real, unceasing *diachronic* flow of time. One consequence of this fact is that consciousness has to be constructed in a series of intersections of time and space Now after Now after Now. Otherwise we should be immersed in a formless flux. Each Now is motionless in time and distanced from the flow, so that we can observe things moving or time passing in relation to it:

> I am soft sift
> In an hourglass – at the wall
> Fast, but mined with a motion, a drift[1] ...

But we too are carried by the stream, so that after we have taken in a brief span of conscious experience in one transition (or 'predication' as I will call it) our position has to be shifted down the wall to the next Now for the next predication. This is what I call the walking motion of consciousness.

We are not normally aware of this process because predications are hardly ever isolated, they are normally grouped in *progressions*, throughout each of which the space of one predication is continuous with that of its predecessor. While time Now slips from one station to the next, space Here remains the same, or at least overlaps in continuity with the preceding space, as when we watch a horse galloping round a racecourse. At the end of a progression, however, the attention switches abruptly to a new space – as for example if you interrupt my observation of the racecourse by pricking me with a pin.

The shift from one Now to the next has no duration and so cannot be perceived; duration is within the span of Now. This is the counterpart of the fact that without an appreciable span of duration no perception is possible.

SUBJECTS AND PREDICATES

I call the step of consciousness Now a predication, because, as already indicated, I regard the core diachronic transition as a grammatical transition between a subject and a predicate. Other relationships within the predication are recognized synchronically (even if they are movements), but this one is a transition in real time. When a predication is expressed in a sentence the transition is marked by

the main verb. This has to have a tense, which links it to real time Now, even if it refers to the past or the future. Subordinate clauses have their own verbs, but that is because they are subordinate sentences, understood separately with their own transitions in time, but then integrated as *synchronic* wholes into the main sentence.

What then do I mean precisely by the subject and predicate? The subject is the initial form on which attention begins to focus. The predicate is the ground against which the subject, as figure or Gestalt, emerges; or the object in relation to which it moves (or remains still); or the agent which moves (or remains still) in relation to the subject; or the complement which is absorbed as an elaboration of the subject. In this last case the predicate is the subject itself with a difference – which may be only a difference of time. If the step between subject and predicate reflects either movement without encounter or a relationship without movement except of the attention, it is grammatically intransitive. If it reflects movement with encounter it is grammatically transitive and must be either active or passive. As the predication is completed, the predicate is integrated with the subject to form the synchronic comprehensive entity, the subject elaborated, which is the meaning of the whole.

COMPLEXITY AND PLURALITY

At its simplest a perceptual subject or predicate may be a single 'cell' of perception, by which I mean a single container form, such as the shape of a leaf, or the duration of a note, recognized in a space and infused with a single value for sensation such as colour or sound. Such a value for sensation can in turn be analyzed as, in some sense, a superposition of other values – for quality, intensity and (sometimes) purity or saturation – which can only be recognized in symbiosis as characteristic of one and the same sensation. All these are values in restricted registers of possibility within ultimate categories of experience. Any one cell can yield only one value for each category; as soon as two shades of colour, for example, can be distinguished, we are dealing with two cells separated by a boundary form.

Almost always a subject is perceived not as simple but as complex or plural, made up of many cells with relationships

between them. Perceptual entities (that is cells or complexes or pluralities of cells) can be differentiated and related along boundaries, across intervals, as part to whole (or vice versa) or by inclusion or exclusion. Any such relationship, if it represents the central diachronic transition of a predication, implies a movement in one direction, either of the attention or of an object, recognized as it happens in time. I can either allow my eye to move across the square, or I can watch a particular vehicle or group of vehicles as they move across the square. If the relationship is a subordinate one, and thus a synchronic one, within the subject or predicate, it is recognized either as an orientation, which applies in either direction, or as a complete movement, such as a stroke or a blow, recognized as a simultaneous whole. In my terminology a complex is made up of parts connected across boundaries and forming a *pattern* as a whole; a plurality is made up of similar units connected across intervals and forming a *structure* as a whole.

A subject–predicate system may include up to about seven[2] separately determined elements, which may themselves be either undivided cells, or sub-complexes or sub-pluralities of further cells at a lower level of hierarchy. The separately determined elements may be either the components of a complex entity, like the notes of a musical phrase, or the units of a plural subject, like seven starlings on a lawn. Given that the subject and predicate are related by a single transition at one level of hierarchy and their elements are recognized at a second level, there is usually no more than one further level in the one predicative system – tree and sky, for example, at the highest level, trunk and branches at the next, then twigs and leaves. In some cases perhaps a fourth is recognized, but this is usually a matter of closing the focus of attention from one level to the next (from the tree to the branches, for example), whereupon a new lower level comes into focus as a higher level is lost.

A complex will have a form-as-a-whole built up by the forms of its component cells or sub-complexes as they fit together; and it will also yield a harmonic value for sensation-as-a-whole representing the cumulative effect of the sensory values of its cells. Our conscious awareness is always of the subject complex as it is developed by the predication into a new form-as-a-whole, which we may call the subject elaborated – a single form which, as I suggested earlier, is the meaning, in Polanyi's sense, of this step of tacit integration. Although the predication takes place over time, once it is completed, the new whole slips into the memory as a synchronic unity,

one which often continues to contribute as a subsidiary element to the next predication – or indeed can become its subject.

Consciousness always requires a completed predication, and the focus of our awareness, as I have indicated, normally shifts from one subject elaborated to another subject elaborated, from one meaning to another, in a sort of walking motion. We have a subsidiary awareness, as Polanyi indicated, of the particulars which are integrated as components at the second level into the meaning of which we are focally aware. Our subsidiary awareness of them is sometimes determinate (when the particulars are 'specified' and our understanding is 'formalized'), and sometimes indeterminate (when they are not specified, and our understanding is unformalized). So far as particulars at the third or sub-component level are concerned, we only have a merged, indeterminate consciousness of them, usually in the form of infused values for the quality and intensity of sensation: a wall which we recognize at one focus of attention as consisting of a determinate number of bricks of individual shape and shade, separated by lines of white mortar, is represented at another, wider focus as an area of indeterminately many similar bricks, and then, at a wider focus still, as a single bounded area of a single colour. But it is evident that vastly more values are presented in potentiality to the mind by its receptor systems on any one occasion of perception than it can actually notice. Perception is a highly selective process, dependent on the mind's use of 'schemata', otherwise ideas, to bring what is relevant to a focus of attention and to relegate the rest.

The processes of perception are extremely complex. I have offered here only the most abbreviated of sketches of a general approach which is elaborated in somewhat greater detail elsewhere. Although so brief, I hope this sketch will be sufficient to give an indication of what I mean by the grammar of perception and so to pave the way for a wider discussion of the grammar of thought and language.

DESIGNATION

I suggested in Chapter 2 that we cannot see or hear or feel or taste or smell anything at the focus of consciousness without at the same time thinking it, that is to say classifying it with the aid of some

general idea. The metric space of visual or tactile perception, or, for example, the melodic space associated with the perception of sound (with its two dimensions of time and pitch measured in different units), is projected on to the quasi-topological space of thought; only then, as a range of possibility is resolved into an actuality, is meaning truly grasped. The effect is that thought provides classifications, while perception designates instances; the particular is mapped on to the general, the tree is mapped on to the idea of a tree.

A similar process of designation takes place when the subject of a predication is not a perceived object but a memory image or an abstract idea. When we focus upon an abstract idea, which is itself a classification, we do so in one of two ways. Either we recognize an instance of it when the situation before us provides and locates the instance ('That was unfair!'); or else we recognize it as being itself an instance of a wider class of idea ('Honesty is the best policy'). Our awareness of the wider class is subsidiary, not focal, but the perspective of the wider class affects the way in which we understand the first idea. The latter case is an example of the process mentioned in Chapter 2 and described by Gregory Bateson as 'logical typing', a term which rests upon a distinction between 'message' and 'meta-message'.[3] In all cases our focal attention is on the instance, the actuality, not on the classification that indicates the potentiality out of which the actuality is resolved. This is what Berkeley is talking about when he says: 'The idea of a man that I frame to myself must be either of a white, or a black, or a tawny, a straight, or a crooked, a tall or a low, or a middle-sized man. I cannot by any effort of thought conceive the *abstract* idea above described'.[4]

There are two kinds of designation, definite and indefinite. Definite designation isolates the instance at a particular time and place, whether real or fictional. This is the designation achieved by the focussing power of perception or of an image of memory or imagination. It involves the recognition of a particular and unique form or complex of forms. An indefinite designation, on the other hand, isolates the instance numerically: one, several, seventeen, many, and so on. The form or forms concerned are not recognized as unique; they are differentiated only by number. The indefinite article (in many languages the same word as 'one') is a designator of this kind, whereas the definite article always refers back to some previously located object, situation, event or idea.

This distinction reflects two different ways of looking at the instances of a class. In the first perspective they are unique forms, individually and determinately recognized, which are nevertheless identified as linked by similarity to other members of a class: 'This is Peter; he is a man'. In the second perspective they constitute a collection of items, or digits, which are in this light indistinguishably the same as each other – a bag of apples, several people, fourteen motor cars, all the houses, and so on.

Cardinal numbers represent classes, and therefore, as I use the word, concepts; in fact they are the most generalized of classes. Thus in the case of indefinite designation it is a numerical class which is projected as a designator on to another class, picking out an instance, or set of instances. We may note that definite designation always implies a numerical designation as well (though the converse is not the case); we cannot perceive or think of anything that is not either singular or plural. It could be suggested that all human understanding is either of specific forms, which, even if counted, are known individually and determinately, or else of digits (undifferentiated instances of classes of forms), which are known numerically but otherwise indeterminately. When we try to fit both modes of understanding together in relation to the same object, we find ourselves relating them hierarchically, with the digits at the lower level and the individually known forms at the higher level: 'This (individually recognized) stick is thirty-seven (undifferentiated) inches long'; 'This (individually recognized) curve is related to these (numerically specified but otherwise undifferentiated) coordinates'.

It is this fundamental distinction which underlies, in my opinion, the famous paradox of Zeno the Eleatic concerning the arrow which is in continuous flight and yet, at each moment, is simply where it is. It is no solution of the paradox to say that the number of points through which the arrow flies is infinite, and consequently there is never a next one, since an infinite number of points come between any two. That is to replace one paradox with another. The flight of the arrow is itself a form – in this case a trajectory in four-dimensional space-time. As such it is recognized at one level as a single, synchronic whole, even though one of the dimensions of its space is what I call an extracted, synchronic time dimension. But it can also be analyzed at a lower level in terms of one-dimensional, numerical coordinates. The gap between the two representations is the same as the gap which Polanyi identified between *text* (consist-

ing of articulated subsidiary particulars) and *conception* (the comprehensive entity which is the meaning of the whole). I would suggest however – and I believe Polanyi would have agreed – that it is better described, not as a gap, but as a difference in what he called levels of being. I shall return to the issue of levels of being in the final chapter of this book.

RELATIONSHIPS BETWEEN IDEAS

Conceptual space is a kind of metaphor of the space of perception and it can accommodate all the latter's spatio-temporal relationships. This is shown by the fact that these are reflected in the prepositions and conjunctions that we use to verbalize our thoughts, even at their most abstract. The distinctions we can recognize, however, are somewhat less sharply determined than in the case of perception. I can think of angles of roughly 30, 45, 90 and 180°, but I can distinguish angles visually with much more precision than that. This appears to be because the metric space of visual perception affords a greater richness of distinction than the quasi-topological conceptual space of thought, even when this has an image drawn from memory or imagination mapped upon it. Popper has drawn up a table of four kinds of geometry – metric, affine, projective and topological – and points out that 'metrical geometry is only very partially reducible to projective geometry, even though the results of projective geometry are all valid in a metric geometry.... Thus we may regard metrical geometry as an *enrichment* of projective geometry. Similar relations hold between other levels [of the table]'.[5] This would explain why we cannot think of visual forms and relationships as sharply as we can see them. Similarly it is significant that with the sensory qualities of hue, taste, smell or sound, although they are not perceived as forms in any kind of geometry, we still cannot imagine them with the same subtlety of distinction as we can achieve in actual perception. When it comes to thinking them, which involves a radical recoding into the language of conceptual forms, the distinctions we can draw hardly go beyond the limited range that we can match with our verbal vocabularies.

If the conceptual space of thought is so impoverished, how is it that we can think complicated thoughts at all? The answer appears to lie in the fact that there are a number of countervailing factors.

First, visual perception, as we have seen, presents in most circumstances immensely more detail than we can consciously deal with anyway. Secondly, conceptual space accommodates the 'adjectival' relationship whereby successive forms are superposed one upon the other in such a way as to produce a single more complex form. (The closest perceptual analogy for this process is to be found in the field of hearing where relatively simple wave forms can be superposed one upon the other to produce a more complex wave form.) Thirdly, conceptual space can accommodate not only spatio-temporal relationships but also logical relationships which depend on the mind's power of generalization. The most important of these can be listed as follows:

- Positive classification (or cap-fitting: this fits into that; this is a member of that class).
- Similarity (this and that coincide at a higher level of generalization).
- Equivalence (or equation: this and that both define the same class).
- Negation (or negative classification: contradiction).
- Contrariety (the relationship between mutually exclusive sub-values, e.g. different colours).
- Comparative reclassification (this instance of a class has more, or less, of a given attribute than that one).
- Superlative reclassification (this instance of a class has more, or less, of a given attribute than any of a group of instances).

It is noticeable that, although these are logical, not spatio-temporal, relationships, we tend to grasp them with the aid of spatio-temporal images.

There are considerable further complexities. I shall not attempt to enter into detail here, but it may be helpful to mention three additional points. The first is that, apart from simple classifications, which yield yes or no values, the mind also makes use of what I call complex registers of classification, which yield several possible but mutually exclusive positive values, in effect defining sub-classes within a major class. You can say that something is coloured or colourless, but within the classification of colour it may yield one of a number of alternative values – red, white, blue and so on. There are several types of complex registers, including spread repertoires (like that of colours shading into each other), polar spreads (such as

hot–cold, or rough–smooth, with values in between the poles) and synthetic repertoires (apples *or* oranges). They can have important logical implications, since conceptual forms can only be superposed upon each other when they are logically compatible, and their compatibility depends in part on the type of register involved. For example the difference between a negative and an excluded alternative sub-value (a contradictory and a contrary) depends upon a difference in registers. I also include in the category of complex registers what I described as a register of causal connexion, by means of which we reclassify certain events as either cause events or effect events, and thereby articulate them into a causal form.

The second point is that, in addition to relationships of reclassification, we can also establish relationships of redesignation within a conceptual space. Here we begin with two separately designated instances (singular or plural) of the same class, and we aggregate them so as to produce a single instance of the same class, but one with a different numerical designation from either of those we began with. Alternatively we can begin with a plural instance of a single class and divide it into two separately designated groups. (This is the basis on which the speculative model which I am describing would reflect addition, subtraction, multiplication and division.)

The third further point which it may be worth making at this stage is that relationships between predications in a given progression or train of thought can take a variety of possible forms, including:

- spatial, temporal or causal sequence;
- deductive reclassification or redesignation ('Therefore...');
- embedding in the role of subject or predicate or designator or superposed form.

Of these embedding is of special interest because it covers a great variety of possible links, including spatio-temporal, causal and conditional links, between a main predication and a subordinate, that is to say, embedded predication.

SOME INTERIM CONCLUSIONS

After this rapid exploration it may be helpful to pause and put together some of the main features of what has been said so far.

Conceptual forms are perhaps more like wave forms than the three-dimensional forms of visual perception, and because of this they can express complexity through superposition (in which the original form is itself modified) as well as through cumulation (in which forms are related to others across boundaries and intervals in space and time to build up complex or plural entities). In addition, as quasi-topological forms, they can accommodate generalization, and so can give expression to further relationships of classification and designation.

All consciousness involves a process of selection and focussing, both from the immensely rich input of our sense receptors and from the unceasing resonance of conceptual forms evoked as associations from the memory structures of the mind-manifold. This occurs in such a way that transitory predicative systems of relationships are created, in which subject complexes are linked over a step of time to predicate complexes, building up forms-as-a-whole; and these are recognized one by one at the focus of consciousness before sliding into the past as new predications follow them. All consciousness is highly complex in the sense that subjects and predicates are normally themselves made up of many subsidiary components and sub-components – particulars as Polanyi called them – which are sometimes determinately recognized (up to certain limits of number), but are more often indeterminately plural. Beyond this, it is also highly complex in the sense that the system of perceptual or conceptual forms that emerges in actuality at the focus of consciousness is itself mapped on to a system of conceptual forms reflecting the range of potentiality evoked from the mind-manifold, to be resolved by the actual experience.

A THEORY OF THE UNCONSCIOUS

When we recognize perceptual forms of any kind, they are always infused with values of sensory quality or intensity. Similarly we can say, on introspective evidence, that all conscious thinking of any kind, including perceptual consciousness (which always involves thinking), is infused with values for a certain quality and intensity of mood or emotion. It seems to me that, at any time when I am conscious, whatever I am thinking is always coloured by a sort of flux of mood; I am never conscious in a moodless way, any more

than I can ever see anything without some quality and intensity of colour, or hear anything without some quality and intensity of sound. If that is so, where does this mental 'colour' or 'mood' come from? I will try to answer that question with the aid of an analogy drawn from music.

Every musical tone has a simple wave form which determines what we recognize as its pitch. But any tuned note played on an instrument normally has a complex wave form created by the superposition upon the fundamental of many overtones of different but mathematically related wavelengths. Normally we hear only the pitch of the fundamental tone. The others are buried individually out of consciousness, yet it is they in their collective impact, which together determine the quality and intensity of the note we hear – whether it calls to mind a trumpet, a flute or a screeching cat. In a similar way, I suggest, the qualities and intensities which accompany conscious thought are derived from the superposition of many conceptual forms. These are individually lost to consciousness, but they make a simultaneous, collective impact through the emotional colouring of conscious experience. They represent in fact an element of collective resonance from the mind-manifold. They reflect the simultaneous (and therefore individually unconscious) impact of forms evoked by current predications, of which only a selected few emerge individually at any one time into consciousness as the 'container' forms of the cells of perception or thought.

If this musical analogy is accepted, it becomes clear that we need to distinguish:

1. the latent unconscious, which is simply the whole contents of the mind-manifold, all that we have ever known or experienced that is still potentially capable of being remembered or of bearing on memory;
2. the active unconscious, which is the shifting cloud of resonance that accompanies and colours all conscious experience;
3. the relatively few subordinate forms, or particulars, of which we are aware in a subsidiary way when we are conscious of anything; and
4. the subject form at the focus of attention at any one time during consciousness.

Apart from the steady accretion of new memories, and the changing of threshold levels that results from them, nothing

happens in the latent unconscious except some further changing of threshold levels due to physiological change. The active unconscious, in contrast, is not so much a separate compartment of the mind as a constant accompaniment and coloration of all conscious activity. The fact that it involves the simultaneous stimulation and superposition of many forms evoked from the manifold inevitably affects the constantly changing threshold levels of the manifold in complex ways, and consequently has a powerful effect on what we think of *next* (Polanyi's 'anticipations'). Unconscious mental processes, being largely simultaneous, are inarticulate and essentially inarticulable, though it is possible to classify their uniquely varying emotional effects in various rough and ready ways (essentially by generalization to a paradigm), and so to bring them to the focus of attention as ideas, such as rage, love, anxiety, boredom, jealousy, terror and so on. When we become aware of dreams, that awareness must be regarded as by definition a feature of consciousness, not of the unconscious, even though the dreams may reflect in indirect and often symbolic form the gradients of the manifold, and so the unconscious needs and desires of the individual.

PREDICATION AND LANGUAGE

So far I have been describing a psychological model of the way in which, as I see it, perceptual and conceptual forms are integrated in grammatical predications to build up 'forms-as-a-whole' that correspond to Polanyi's focally known 'comprehensive entities'. This theory of what I call the grammar of perception and thought is in effect a theory of semantics, since these comprehensive entities are in my view (as indeed in Polanyi's) to be regarded as meanings.

If that is so, how does the grammar of perception and thought relate to the grammar of language? According to my account the grammar of thought is central. We cannot perceive or imagine anything *consciously* without projecting perceptual forms on to conceptual forms, a perceptual space on to a conceptual space. Similarly we cannot think any conscious thoughts without projecting one idea on to another and so identifying conceptual forms in a conceptual space. It is this which makes possible the transmission of information, the resolution of a limited range of possibility into actuality. It is this which makes possible the identification of a subject form and its elab-

oration through the process of predication. Correspondingly, as I see it, the grammar of language is the servant of the grammar of thought. It is, as Michel Foucault put it, 'the study of the verbal order in its relationship to the simultaneity which it is its task to represent'.[6]

The grammar of every language contains on the one hand words (or their equivalent) which convey substantive meanings, and words (or their equivalent, including inflexions, endings and elements of word order) which convey structural meanings. The function of the structural word elements is essentially to indicate how the substantive word elements are to be fitted together in a conceptual space, so as to build up the form-as-a-whole which the sentence is to convey. They act as templates or assembler forms to indicate how and where the substantive elements fit together; after that, their work done, they fall away. Understanding a sentence is a matter of taking a one-dimensional linear series of substantive meanings and reassembling them, in the manner of a multi-dimensional jigsaw puzzle, to create a meaning-as-a-whole which, being a single form, is, as Foucault emphasizes, a *simultaneous* whole. In Polanyian terms this is the tacit component, the conception focally known through the coherence of its parts, which it is the function of the formalism of language to transmit but which is in no way reducible to its parts and their relationships.

Once complete, the same form can be re-expressed in different ways, or in different languages, just as the same loaf can be sliced in different ways. But though virtually the same form-as-a-whole can thus be recreated, sometimes briefly and neatly, sometimes more clumsily and at greater length, different sets of words nevertheless have differing resonances of association, both individually and in combination; and consequently the emotional coloration conveyed by one set of words may be very different from that conveyed by another set of words with much the same focal meaning. Consider two resonant lines of verse:

> But at my back I always hear
> Time's wingèd chariot hurrying near

It is possible to translate their literal meaning quite accurately as 'But I feel it's getting a bit late'. If we do so, however, we experience an enormous difference in the quality and intensity of the flux of mood accompanying the words.

The rules of syntax identify the binary relationships between different substantive word elements – as when a preposition identifies a spatio-temporal or possessive relationship between two nouns (or noun equivalents such as noun clauses). The rules of accidence define the roles which the word elements take on when they fit together in accordance with these relationships – indicating, for instance, that this is an adjective and this is the noun on which the adjective form is superposed. Together the two sets of rules build up the rules of the grammar of language. My view of grammar, as I have already indicated, is basically a traditional one. I consider that the Chomskian approach to grammar as a generative–transformational process, following in effect the serial plod of the digital computer, is misguided. (And it is in my judgment ultimately quite irreconcilable with Polanyi's approach to knowing and language.) But I am sure Chomsky is right to distinguish the rules of general or universal grammar – which I would identify with what I call the grammar of thought – from the particular grammars of particular languages. I have suggested that the latter, reflecting very different vocabularies, deal with the widely varying ways in which different languages relate the linear sequence of words to the multidimensional form to be built up from the meanings they transmit. Once the rules of universal grammar are worked out and accepted, linguistics emerges as essentially a taxonomic science – and, as Polanyi with his interest in taxonomy and connoisseurship might have said, none the worse for that.

I have argued that the unit of understanding is the predication, which is reflected in words by the sentence. But how can this be reconciled with the fact that we often make sense of quite obscure signals, or quite fragmentary or incorrect speech? My answer is that the mind has an inbuilt tendency to create meanings, to build wholes out of fragments, to make sense of what is before it; and consequently it is constantly making its own adjustments or guesses to fill in missing spaces. In the case of speech in a given situation it is usually quite easy, especially with the use of body language or special inflexions of the voice, to 'understand' or fill in missing elements; but in the case of written language much less can be left to be 'understood'. (These issues are discussed with much insight by Vygotsky.[7] Hodgkin's discussion of the cooperation between the two hemispheres of the brain, which I mentioned in Chapter 2, is also apposite.)

In addition to simple sentences, any developed language makes much use of complex sentences, in which subordinate clauses are incorporated within an overarching main sentence. Each subordinate clause is in effect a simple sentence, the meaning of which is understood as a whole and then incorporated into the meaning conveyed by the main sentence. Where and how it is incorporated is indicated by a link element such as a conjunction or relative pronoun. All subordinate clauses can be classified as adjectival, noun or adverbial clauses according to the manner in which they are incorporated. Within each individual clause or sentence there can be only one verb in the indicative, subjunctive or imperative mood, identifying the single transition in time which forms the hinge of each predication and so links the subject with the predicate.

If it is accepted that the unit of understanding is the predication, a further question arises. How do we understand the greater wholes which it may take many predications to express – in the case of words many paragraphs, many chapters, even a whole book? My answer is that in the case of a paragraph, for example, we build up the form-as-a-whole conveyed by succeeding sentences within a continuous conceptual space established initially by the first one, generalizing a good deal as we go. Then, with a further step of generalization, we grasp as a whole the meaning of the paragraph as a separate predication. If a book is printed without paragraphs we find it significantly more difficult to read, because we have to establish appropriate chunks for wider understanding ourselves. The same process is repeated, with ever greater generalization, in the case of chapters and books. When we finish a book, if it is coherently written, we have some very generalized sense of having grasped its meaning as a whole, just as with the last prolonged cadence of a symphony we have some sense of grasping a completed whole.

Any comprehensive account of the mechanisms of language would need to deal with a variety of further ways in which meanings are built up. Verbal nouns, like 'defeat', or verbs in infinitive or participle form can be used to encapsulate whole predications in a generalized and synchronic way. A theory of idioms can be developed to show that idiomatic constructions in their enormous variety of forms are in effect supplements to the vocabulary of words, making it practicable to convey particular types and

patterns of meaning much more economically than would otherwise be possible: true idioms, as distinct from set phrases, are virtually always subtle short cuts. Detailed attention would need to be given to the way in which, through the mutual resonance and mutual compatibilities of the words of a sentence, new ranges of possibility are successively opened up and ultimately resolved; and also to the way in which the tenses of verbs indicate relationships to the passing of time Here Now for the speaker – a point to which I shall revert briefly in a wider context in Chapter 10. But for present purposes what has been said may be sufficient to indicate how the grammar of language fits in with the broad account I have given of tacit integration as a grammatical process. In the next chapter I propose to turn to the functional, purposive nature of thinking, and to the categories of knowledge to which consciousness provides access.

4

Purpose, Meaning and the Categories of Knowing

THE PURPOSIVE CYCLE

Polanyi refers in *Personal Knowledge* to 'the purposive tension from which no fully awake animal is free', and goes on to suggest that this tension underlies a two-stage process of problem solving: first perplexity, then activity in doing and perceiving, which dispels the perplexity (*PK*, 120). This leads to an analysis of the process of problem solving, especially in the area of scientific and mathematical discovery. Polanyi is at his most impressive when he is discussing the ways in which a scientist thinks and works, and he draws on an immense field of reference. There is nothing that I can add directly to what he says here. None the less I think it may be useful to extend his discussion in some respects within a wider framework.

Polanyi is wary of cybernetics because it has been used by behaviourists to build a model of the mind as 'a machine which "learns" by selecting the "habit" which had proved successful in a series of random trials' (*PK*, 121; see also 37, 328; *KB*, 156). But he himself argues that modern communication (or information) theory 'turns out to be based on a clear recognition of personal mental processes' (*PK*, 37); and cybernetics itself, as the theory of self-regulating systems, is certainly not inherently hostile to such ideas. Regulation is the application of rules or constraints on possibility; but in a conscious being capable of learning this is not a mechanical process, for the rules, which represent the constraints of reality, are self-discovered and, as Polanyi would say, 'self-set'. 'The ordering principle which originates life is the potentiality of a stable open system' (*PK*, 383–4).

I have argued elsewhere that the mind is the controlling unit of a system whose activity is a series of steps of regulation (which are decisions or choices), taking some of the possibilities of the future

and resolving them into a narrower actuality. Each act of regulation is related to some kind of goal and an attempt, if possible, to achieve it. When Polanyi suggests that the purposive tension in an animal arises 'from its routine efforts to retain control of itself and its surroundings', this is precisely what he is talking about. I prefer, however, to use the more inclusive terminology of defining and achieving goals, or purposes, rather than the narrower terminology of problem solving. If I decide to fill my fountain pen and do so, I am hardly solving a problem, but I am certainly defining and achieving a goal.

It can be argued that the activity of living is ultimately related to the drive of every living organism to survive and reproduce itself; and that this in turn is reflected in the need to keep what Ashby calls the 'essential variables' within acceptable limits, a need mediated, in however complex and indirect a way, by the emotional mechanisms of pleasure and pain. Polanyi says that the animal is never free from purposive tension. The way I would express this in terms of the model outlined in Chapter 3 is that all consciousness involves predication, and every predication forms part of a *purposive cycle.*

The concept of a purposive cycle can be thought of as a somewhat elaborated version of Polanyi's two stages of (i) perplexity and (ii) resolution of perplexity. Different versions of such a cycle have been proposed by James G. Miller and others. My version suggests that in five stages the organism sequentially:

- identifies goal or aversion images (*exploring and orientation*);
- elaborates possible courses for attaining them, or escaping from them – largely a process of playing with ideas in 'potential space' and discovering their possibilities (*purposive model building*);
- chooses between these courses (*decision*);
- takes action accordingly, and monitors the action and its effects (*actualization* – otherwise *action and monitoring*);
- assimilates the result, successful or otherwise, into the memory store (*readjustment*).

Every predication in conscious life fits into one or another of these stages in one or another purposive cycle. The mind has many different purposive cycles in play at one time and can switch between them at a moment's notice. Some are so brief that they are completed within a second or so (as when I decide to pick my pen up

from the floor); some can stretch many years into the future. A purposive cycle can be brought to the focus of consciousness as the subject of a predication, but in itself it is not a conscious process; it is rather a feature of the shifting gradients of the mind-manifold, which channel and direct the resonance that is evoked by our experience from moment to moment, and so govern the selection and focussing of subjects for attention.

An account of purposive thinking, the central function of conscious life, on some such lines as these seems to me to be essential to any comprehensive account of the working of the mind and the nature of the self. It suggests furthermore a possible approach, in one aspect, to the mystery of consciousness itself, which can be seen as a necessary means of ordering our predications in single file, in such a way that we take only one conscious decision at a time and so avoid conflicting courses. (This is a point also made by Gerald Edelman in the book discussed in Chapters 7 and 8.)

Apart from his two-stage analysis of the process of problem-solving, Polanyi, following Poincaré, also distinguishes four stages of discovery, preceded by an initial stage of appreciation of the problem. Within the framework I have proposed, the appreciation of the problem falls in the stage of exploring and orientation which ends in the identification of a goal or aversion image – an image representing the resolution of the problem, the object of desire, as distinct from any method of achieving it. The four stages of discovery – preparation, incubation, illumination, verification – represent an elaboration of my second stage, that of purposive model building. Such an elaboration is applicable particularly in cases which are specifically 'problematic' because no immediate insight is afforded as to how the goal can be achieved.

PURPOSE AND MEANING

I referred to Chapter 1 to Polanyi's assertion that tacit knowing contains a general theory of meaning. In effect he equates meaning with the 'comprehensive entity' which is the object of our focal knowing. We give meaning to subsidiary particulars by attending from them and through them to the greater whole in which they are integrated. The act of comprehending a whole is described as an interiorization of its parts, which makes us dwell in the parts. In

Chapter 2I suggested that this comprehensive entity is always a form, perceptual or conceptual, recognized as an actuality mapped on to a wider conceptual form, or classification, identifying a limited range of possibility. Polanyi distinguished existential from denotative meanings, and I suggested that this distinction might be used (though not quite in the sense he intended) to refer to the two basic systems of ordering memories in the mind-manifold: an immensely flexible space-time map, and a system of classifications ordered under markers derived from all the signs, codes and languages known to the individual. Any form recognized as having a location on the map could be said to have an existential meaning, while any form recognized only as an instance of a class could be said to have a denotative meaning.

There may appear however to be something incomplete about this account of meaning. If the subsidiary particulars effectively derive their meaning from the wider whole in which they are integrated, and lose their meaning if we focus on them in isolation, why does not the form at the focus of our attention in turn lose its own meaning if we focus on it in isolation? The answer is that in isolation it does. The form-as-a-whole which we build up and grasp as the subject elaborated in a predication is itself meaningless unless it is grasped as an actuality emerging against a wider range of possibility, recognized in a subsidiary, not a focal way. In practice this is always provided through the purposive cycle of which the predication forms part. (A predication is never not part of a purposive cycle.) If a philosopher says that meaning is use, the point of this shorthand phrase, as I understand it, is that the meaning of the form we grasp is its function in relation to the achieving of a purpose. The purposive cycle sets the perspective in which the form is grasped, and the perspective gives it its meaning. And this, I suggest, brings us back to Polanyi's point that all knowing is personal knowing, since only a person can have a purpose. An animal can have a purpose, but then at least some animals exhibit personality.

FORMS AND THE OTHER CATEGORIES OF KNOWING

What we know is irremediably complex. Every predication, every conscious awareness of anything, involves a recognition of *forms*,

qualities, intensities and *relationships*, building up together the cells, complexes and pluralities of life as we encounter it. There is a considerable variety of categories of experience to be identified under each of these four headings – two- and three-dimensional forms, colour, loudness, heat, taste and many more – but our analysis has suggested that the words I have put in italics identify what might be called four hyper-categories, which are always represented in every conscious experience.

As this implies, no values in any of them can ever be grasped in isolation from values in the others. Individually these values are elements in the codes and languages of the mind (inherited as propensities, but developed by use), in terms of which complex predicative encodings are built up and experience is conveyed. They cannot be regarded as independent bits of reality directly apprehended. Nevertheless it would seem that what we determinately *understand* is always a form, whether perceptual or conceptual. The complex grammatical process of tacit integration is primarily an integration of forms, leading to the comprehension of a form-as-a-whole, which in Polanyi's terms is a meaning, a conception, a comprehensive entity. But if that is so, what are we to say of the qualities, intensities and relationships? It seems to be possible to bring values in these categories to the full focus of attention only by recoding them as ideas, that is, conceptual forms. The idea of red, or of an oboe's timbre, or of intense brightness, or of a mood of black depression, or of the shifting spatial relationship between two cars in moving traffic is not identical with the experience itself – though the experience can be mapped upon it. We need the ideas in order to be able to think of such things (in other words we have to treat them as 'things' in order to think them); but the idea without the experience mapped upon it is much vaguer and more approximate – and by definition it will lack the original quality and intensity of the experience.

We do in fact possess a faculty of imagination through which we can project *images* of values in all perceptual categories, including images of perceptual forms, upon the relevant ideas; but the values of perceptual imagination (except in certain rare pathological conditions) are much vaguer and weaker than the values of direct perceptual experience; and even in imagination the distinction between forms and other values to which I have drawn attention still holds.

How is this distinction to be interpreted? I suggest that we can best understand it in terms of Polanyi's distinction, discussed in

Chapter 1, between subsidiary particulars that are specified and subsidiary particulars that are unspecified, or even unspecifiable ('ineffable'), together with the consequent distinction between 'formalized' and 'unformalized' meaning. In my own terms this is a distinction between forms determinately known and forms indeterminately known. Particulars of which we are determinately aware are those which have identifiable forms of their own, even though as subsidiaries we can grasp them only in relation to the comprehensive form at the focus of attention. Although particulars of which we are indeterminately aware may also have forms of their own, they are not individually identified – for example when we recognize an indeterminate number of similar bricks in a wall, or see a shimmering multitude of wavelets on a lake, or hear a cascade of notes played *glissando* on a piano, or think in a general way of the many possible meanings of the word 'form'.

The difference seems to lie in the use of a wider focus of attention. And it is to be noted that at a still wider focus than this the multitude of forms is resolved into a single particular of a different sort – one colour or texture or sound – recognized with an intensity of its own. This last transition involves a shift from categories of forms to categories of quality and intensity – but we need to bear in mind that the individual bricks, wavelets, etc. were always, as cells of cognition, infused with their own qualities and intensities which are subsumed, at the wider focus, in the collective impact of a single value for the whole within a larger container form. Although we may experience this collective quality and intensity with precision and force, the experience remains indeterminate in the sense that we cannot grasp or comprehend it without making an idea of it and projecting the quality and intensity upon the idea.

I have suggested that when we translate a quality or intensity into an idea without continuing to project the original quality and intensity upon it, we are liable to lose much of the precision of the experience. We can however in some circumstances introduce a new kind of precision by measuring, and so quantifying, the experience. This is essentially the method of science, which generally proceeds, as Polanyi showed, by an alternation between intuition and formalization or computation, but nevertheless aims always to achieve a fully formalized, and thus fully communicable, articulation of its results. Because science is concerned with the determinate and specifiable, it prefers the narrower focus and deals essentially with forms or, preferably, digits (which are instances of

classes of forms), not directly with qualities and intensities. If it cannot measure or specify precisely, it will use statistical methods of quantification. Even when it is dealing with forms, or relationships between forms, it is seldom at ease until they can be specified, measured, quantified.

As I have indicated, it is possible to communicate directly something of the quality and intensity of an experience through the poetical use of words or through other aesthetic means of expression. But the communications of art, though they are powerful and extremely important just because they can reach beyond the quantifiable, are much more variable as between different recipients than are the closely specified communications of science. Indeed the value of the communications of art, concerned as they are with resonances as much as with forms, does not seem to depend on producing the same effect on each recipient; great art has a certain inexhaustibility, a value which is renewed in a different fashion in every generation and in every person who is able to receive its communication creatively.

PRIMARY AND SECONDARY QUALITIES

It will be evident that by a Polanyian route I have come round to a position which appears to carry some echoes of Locke's distinction between primary and secondary qualities. Locke is not entirely consistent in his use of terms, but I quote J. L. Mackie's exposition of his doctrine on this point:

> While there are ideas both of primary and of secondary qualities, and all such ideas are in our minds, the primary qualities are the intrinsic properties of material things, large or small – that is, shape, size, number, motion-or-rest, and solidity – and the secondary qualities (colours, sounds, tastes, etc.) are powers of material things, whose basis is the primary qualities of the minute parts of those things.[1]

Locke maintains that our ideas – our conscious recognitions – of primary qualities directly reflect the shapes, motions and numbers of material things, while our ideas of secondary qualities bear no resemblance to the minute parts of material things which indirectly

produce them through their effect on our sensory apparatus. Mackie points out that since the seventeenth century science has always in practice assumed this distinction, though solidity has lost its place among the primary qualities and has been replaced by such inferred features as electric charge and rest mass, which cannot be counted as primary by Locke's criterion. For science the real world has always been the world of primary qualities, including such inferred realities as electric charge, but excluding secondary qualities. Philosophers, however, from Berkeley onwards have generally argued against the distinction. In Mackie's view Locke's argument, properly understood and subject to one or two corrections (in particular the omission of solidity from the primary list), has not in fact been discredited. But it does, as he emphasizes, depend on a representative theory of perception, distinguishing sharply between ideas in our minds and any externally real things. I shall be turning to the implications of our discussion for the theory of knowledge in Chapter 9 of this essay, and I shall not therefore attempt to deal with that aspect here – except to make it clear that I do not agree with Locke about it. Nevertheless I think it will be appropriate at this point to explore in a little more detail the psychological aspects of what happens when we recognize these secondary qualities.

I have suggested that the whole which in Polanyian terms is grasped as a 'comprehensive entity' at the focus of consciousness is always, and can only be, a form. The subsidiary particulars in terms of whose coherence the comprehensive entity is recognized can themselves take the shape not only of component or sub-component forms, or relationships between them, but also of qualities and intensities infusing them. Yet it is noticeable that qualities and intensities, unlike forms and relationships, cannot be directly specified, or in other words known in terms of their own components. We cannot specify components or features of the particular shade of red in an autumn leaf in the way that we can specify features of the shape of that leaf. We can try to locate the shade by comparison with others, but that is not the same thing as directly seeing elements that go to make up the shade. The components are, as it were, dissolved in the whole.

This phenomenon, I suggest, may be connected with a difference in the methods by which we generalize forms on the one hand, and qualities and intensities on the other. As we have seen, the mechanism by which *forms* are generalized, and hence classified and

identified, seems to be best described in terms of their flexibility and variability within a conceptual space which is metaphorical and quasi-topological in nature. (The 'general inconsistent idea of a triangle' was taken as an example.) A relatively particularized form is projected upon a more generalized form in such a way as to resolve into actual in-form-ation the area of potentiality which the latter defines. In the case of *qualities* and *intensities*, however, a different mechanism is used. If the values of quality and intensity that we recognize depend on the total number and proportional mix of certain kinds of underlying brain events, it would seem that we must classify them by reference to paradigm values defined by certain quantities and proportions, to which the actual value apprehended on a particular occasion may be approximated in greater or less degree. In practice we label such apprehended values instantly in terms of broad classes such as hot, green, bitter, loud and many others. And this seems to be possible only because we are able to generate from within, as it were, a limited range of images establishing paradigm colours, intensities and so on, which in turn we associate with a range of ideas, or conceptual forms, labelling these images.

An image might be described as a sort of synthetic input to consciousness, generated from the mind-manifold, but akin to the input from direct experience. Except in certain pathological cases, this input, whether visual, auditory or whatever, lacks the precision of form and relationship, the density of quality and the intensity of sensation or emotion characteristic of direct experience. Nevertheless it is identified in the same categories. Paradigm images of quality and intensity are derived in some degree from past experience, and they may vary considerably according to our history, our culture, and our immediate circumstances (whether, for example we are looking at flags on a public building or at shades of grey-green on a colour card). But we do seem to have an innate tendency to establish, as part of the way in which we learn to divide up the world, a limited number of such basic paradigm images, with which concepts can also be associated. In the case of colour the number, though it varies among cultures, is usually between eight and eleven, though in some cases it can be as low as three or four.[2] This does not of course mean that we can distinguish only the paradigm colours. Rather it means that within the perceptual category of colour we establish sub-categories related to these basic colour concepts; and the sub-categories mark out territories,

within each of which there is a wide range of distinguishable values. (It has been said that human beings can distinguish altogether about 200 different shades of colour.) Paradigm images, in other words, more or less arbitrarily demarcate the continuously varying spectrum of colour possibilities. On any particular occasion, depending on the context, having established a register of possibility (a relatively limited range of possible values that can in some cases span the vague borderline between two paradigms), we recognize particular values within that range, as information is passed and potentiality is resolved into actuality.

Our *ideas* of colour are limited to the basic paradigms, together with a number of others established by association with particular types of object – peach pink, sea green, lilac, ruby red, and so on. But we cannot think or describe colours with anything like the subtlety and precision with which we can sense them. And the same applies to all qualities and intensities, whether of the senses, or of mood or emotion, or of the pain or pleasure that qualify other experience. We have a few basic paradigms for emotion, reflected in a few basic and vaguely defined words like anger, sadness, fear, envy, anxiety or joy. But the words and the vague images of emotion which accompany them are essentially means of establishing broad classifications, broad ranges of possibility, within which subtle particularities of quality and gradations of intensity can be located and identified. In other words their function is to enable us to focus down within the very wide area of sensibility represented by the category of emotion (as also the various categories of the senses), in such a way that we proceed to locate sub-categories, and then *ad hoc* registers, on which actual instances of experience can be projected and assimilated. It is noticeable that whereas the recognition of qualities usually depends upon a small repertoire of paradigms, such as those for taste, which shade or blend indeterminately into each other, intensities are recognized on polar registers of two extreme paradigms, such as hot and cold, bright and dark, loud and soft, in relation to which apprehended values are located in a linear fashion.

Precise qualities and intensities of experience cannot be specified, at least in the terms in which we actually become conscious of them. A scientist may be able to measure and specify accurately the conditions which give rise to them with the aid of his instruments; but thereby he arrives at certain ideas or conceptual *forms* describing these conditions. In my terms he is translating the experience

out of the categories in which it is experienced. We come back to the strong preference of science, which we have already noted, for facts that can be specified, measured and quantified.

Both Daniel Dennett and Gerald Edelman, from their different angles, have considered the question of secondary qualities or 'qualia', and I shall be discussing their views in later chapters. At this point, however, I will bring to a close my attempt to suggest a broad psychological underpinning for Polanyi's theory of tacit knowing. I have made this attempt by outlining what is admittedly a complicated, speculative model of the processes involved in perception, thought and language. Much turns on what I have proposed to be the nature of ideas as conceptual forms. Some may find this hard to take; but if they are not conceptual forms, what alternative is suggested? No doubt this model has imperfections, but it does at least bring out something of the functions which have to be accounted for. There is no escape to be found by turning from the specific and reverting to indefinite talk at a high level of generalization. Where this model is astray, it needs to be replaced by a better one. I would also ask the reader to bear in mind that the account given here is extremely compressed. If I was asked how these ideas could be put to the test experimentally, my answer would be by testing out in detail the elaborated theory of language in all its functions which I am prepared to offer. I suggest also that the close compatibility of these ideas with Polanyi's theory of tacit knowing helps to reinforce their plausibility, as they in their turn reinforce the plausibility of Polanyi's own position.

In the meantime I have to take note that important work, yielding models of the mind and of consciousness built up in very different ways from my own, is being done in the fields of cognitive science and neuroscience. In the next four chapters I propose to examine the models proposed by Daniel Dennett in his 'Consciousness Explained' and Gerald Edelman in his 'Bright Air, Brilliant Fire: On the Matter of the Mind', with a view particularly to considering the extent to which they are in conflict or consonance with the position that I have tried to establish. My hope is that my model, based on analysis at a higher level of functioning, will be capable, with due adjustment, of accommodating and integrating many of the advances achieved in these fields.

Before moving on to the next chapter, however, I need to make a few comments on certain views of Richard Rorty which have a bearing on the theory of predication which I have put forward.

RORTY ON PREDICATION

Rorty's 'Philosophy and the Mirror of Nature'[3] is a remarkable, if slanted, guide through the high scholasticism of analytic philosophy, pointing towards a new destination. There are many things to admire in it, and much that I can accept. But there is one section of seven pages entitled 'Kant's Confusion of Predication with Synthesis' on which some comment is required here.

I am not in a good position to defend Kant himself, on whom I not an expert. Kant's categories are not my categories, and his use of words such as concept, intuition, manifold, and synthesis is very much his own. But I am certainly concerned to defend certain ideas of mine which may have partial Kantian correlates, and might seem vulnerable to Rorty's new broom. Examples are the notion of predication as the unification (or tacit integration) of particulars in a whole; the idea that without a completed predication there is no consciousness (and therefore no knowledge, whether true or otherwise); the conclusion that consciousness is irremediably complex, a matter of the integration over a transition in time of subsidiary particulars – forms, qualities, intensities and relationships – in a focal 'comprehensive entity'; the need for such a predication to be synthesized from a point of view, that of a person Here Now (without which there is no consciousness); and so on.

Rorty dismisses, with ridicule rather than argument, the suggestion, supported by Strawson and C. I. Lewis, that cognition involves a duality of general concepts and particular instances. Such thinking, he claims, is supposed to explain how knowledge is possible – without any messing about with neurons, rats or questionnaires. So far as I am concerned, however, this suggestion does not attempt to explain how knowledge is possible, it merely explains something of what we actually mean by knowledge, namely the inescapable fact that we cannot think without classifying things (as every language shows). Classes have instances; we need both in order to think, and without thinking we cannot *know* anything (Gerald Edelman's analysis, incidentally, to be discussed in a later chapter, shows clearly that this requirement cannot be avoided by turning to a theory based on neuronal activity.)

Rorty castigates as 'fuzzy' Kant's wide understanding of the word 'experience' when, as it seems to me, it is simply being employed as a useful comprehensive term for all that happens in consciousness, much as it is used in ordinary language. He suggests that if Kant had

regarded knowledge as a relation between persons and propositions, he would not have needed the notion of synthesis. Yet this relation between persons and propositions is, I believe, precisely what Kant actually meant by synthesis. It is an active relation: 'To this act we shall give the general appellation of *synthesis*, thereby to indicate that we cannot represent any thing as conjoined in the object without having conjoined it ourselves'.[4] In my terms it is the *person* (not the concept) who constructs the proposition, conjoining elements in a predication, and in the process becoming conscious both of these subsidiary particulars and, at a different level, of the whole that they build up. But the person has to do this from some point of view. My Polanyian argument (which tends to support in some respects the main thrust of Rorty's book) is that impersonal knowledge from no particular point of view is inconceivable. But if so the construction has to be in some kind of space in which the person, or some representative of the person, is also located. Relationships other than in a space – even though it may be a non-perceptual or metaphorical space – are also inconceivable; you have to bring things together somehow in some spatial or quasi-spatial way if they are to be related at all, if the word relate is to have any meaning.

In Kantian terms the viewpoint is that of the transcendental ego or subject of thought. This is no more than 'the feeling of an existence without the least concept'; it 'is only the representation of that to which all thinking stands in relation'.[5] In itself it is 'quite empty and without significance'. But representations are unified in relation to it, and consequently it makes consciousness possible; without unity no consciousness. The converse of this is that 'The ego is but the consciousness of my thought'.[6] (Rorty says nothing about consciousness in this context, and not much anywhere else.) We may be tempted to think that even if the transcendental ego is not itself 'the thinking subject', 'the unknown subject', it may in some sort represent it; but for Kant this is a dangerously misleading argument because it implies that we can regard the thinking self or soul as a substantial thing in itself. For my part I regard the underlying self or person as the total trajectory of a life from conception to dissolution, an existence in time and space (though one which might eventually be resurrected in total transformation beyond our time and space). Consequently I am less frightened of treating the transcendental subject of thought, the point Me-Here-Now from which at any time the person relates to anything, as the person's featureless, temporary representative.

Apart from this, Rorty asks how we can know that the mind, as Kant claims, is presented with a diversity, a manifold. What if a mystic were to say that intuition presents us with unity? Which of the two would be right? My answer – which admittedly I cannot prove beyond argument – is that a true mystic, even if he refers to the One, is not talking about a singular thing. The 'white radiance of eternity' which Rorty mentions is not a thing, falling under the category singular rather than plural. If it was, you could say something about it, whereas what is surely beyond dispute about the mystic's experience is that it is strictly incommunicable. Even to speak of it as 'an experience' is no more than a metaphor. Thus Nicholas of Cusa speaks of God as absolute simplicity, but also absolute infinity; and says at another point: 'O most wondrous God, Thou art neither of singular number nor yet of plural, but art above all plurality and singularity'.[7] Not surprisingly the experience of such a God cannot be directly expressed. To take a very different example, consider the poet Rainer Maria Rilke:

> Wir haben nie, nicht einen einzigen Tag,
> den reinen Raum vor uns, in den die Blumen
> unendlich aufgehn. Immer ist es Welt
> und niemals Nirgends ohne Nicht.[8]

We always have the world before us, he says, never pure space. Examples could be multiplied. But the essential point here is, I believe, that all experience is predicative in form and therefore both a unity at one level (that of the 'comprehensive entity') and a diversity at another (that of the subsidiary particulars). These particulars do not always have to include component or sub-component forms distinct from the subject form – as, for example, when we look at an expanse of blue sky or listen to white noise. But the (grammatical) subject itself, even in a case like this, will always be bounded, although perhaps only by the limits of a field of vision or a sound bite or a classification; and a boundary is not only a form, it implies a relationship with whatever is across the boundary. Moreover the particulars will also always include some experience of quality and intensity as well as relationship.

Rorty goes on to ask whether Kant was right in his assumption that diversity is found and unity made. How can we know that sensibility presents us with a manifold as a premise, or that concepts are synthesizers? And how could it matter? For my part, I think it is

people rather than concepts who are synthesizers. But I do not think it is possible to distinguish what is given from what is made. Here I follow Harré, for whom a phenomenon is a blend of what the 'glub', or occurrent reality, affords and what the apparatus, including the human neurophysiological apparatus, admits. No distinction can be drawn allocating some features to the one and some to the other. We cannot say that the world or 'glub' is itself a manifold, a diversity, we can only say that what the world and our apparatus in their indissoluble blend yield together in consciousness is always a unification of diversity, a predicative synthesis. (Harré's theory is discussed in more detail in Chapter 9.)

We cannot divide knowledge from consciousness, since what we know at any moment is what we are conscious of at that moment. We may have available in memory or in books a great load of what I would call latent knowledge, all derived from prior moments of consciousness; but we do not strictly know any of this until and unless it is retrieved and brought before our consciousness in predicative form. The degree of certainty which we attach to any conceptual form, or to any proposition building up a conceptual form is no more and no less than its conductivity to purposive thinking in a particular context; and this in turn is an intuition, to use Kant's word, derived from the cloud of association accompanying our cognition of the form, and expressed in the quality and intensity of the mood with which the form is infused. By examining and quantifying evidence, or working through arguments, we can extend and alter the nature of this cloud of association; but we can only take a revised reading for conductivity by tasting once again, as it were, the new collective impact, in quality and intensity, of these extended and altered associations.

In the last paragraph of this section Rorty argues that the 'quasi-psychological goings-on' described in the 'Transcendental Deduction' 'have no introspective ground', and on this basis he rejects the claim that 'knowledge of necessary truths about made ('constituted') objects is more intelligible than about found objects'. Whether or not Kant made such a claim, in my own thinking no distinction between constituted and so-called found objects is possible anyway, since without a completed predication there is no consciousness. This I argue indeed on introspective psychological grounds – briefly in Chapter 3 above, in more detail elsewhere. On the other hand I do not wish to suggest that anything we know is a 'necessary' truth, unless it be a mere tautology. In my view we can

only say, think or perceive anything in terms of some code or language. The work of psychologists such as James J. Gibson[9] is relevant here. Our perceptual system uses a complicated code with a vocabulary consisting of what I call values upon registers of possibility, which are established *ad hoc* within wider categories of possibility, such as hue or loudness, and ultimately within the four hyper-categories of form, quality, intensity and relationship. But this does not mean that if we disentangle and understand exactly what all the mind's perceptual, linguistic and other codes are and how they work, it will help us in any way to understand better what is in the world – except perhaps quite marginally if it helps us in certain circumstances to avoid self-deception. In any case, as Polanyi saw, the meaning of the subsidiary particulars in a given situation depends on the whole within which they are 'interiorized', as the meaning carried by particular words depends on the sentence within which they are understood.

5

A Reductionist Theory of Consciousness

THE REDUCTIONIST APPROACH

Daniel Dennett is a self-declared materialist and reductionist. My intention in this chapter and the next is to offer a summary and critique of his views as expressed in his *Consciousness Explained* (*CE*). 'Somehow the brain must be the mind', he says (*CE*, 41), and this is effectively a starting point, an assumption, rather than a conclusion. Materialism is 'a received opinion approaching unanimity' (*CE*, 106). Nothing but information passes into the brain through the senses, and the brain's activity is nothing but information processing. Information itself is 'just an abstraction made concrete in some physically modulated medium' (*CE*, 55). He does not further discuss the relation of such an 'abstraction' to a materialistic reality; but the brain/mind for him is essentially to be explained as a form of digital computer, and is therefore tied to the computer's one-dimensional serial articulation of ones and zeroes, modulated in this case by nerve impulses.

The brain is, to be sure, a parallel processing computer, with a remarkable capacity for the simultaneous processing of different streams of information; but ultimately everything must none the less be expressed in terms of simultaneous one-dimensional streams. Dennett acknowledges that such a format seems remote from the phenomena of consciousness; but we have to go beyond phenomena, he says, in order to explain them. When a computer represents images, no two-dimensional image is to be found within it, but individual digits code for where each dot of the eventual image is located in relation to others. As a result the operations in the computer are homomorphic with what we see as images on a screen (*CE*, 91). Dennett implicitly denies that what we recognize as a form is to be differentiated in any fundamental way from the digital coordinates of the form. In a parenthesis he somewhat mis-

leadingly explains 'homomorphic' as meaning 'parallel', thereby avoiding any direct reference to shape or form. He also, I think, implicitly denies that a whole can be different from the sum of its parts – a fundamental issue for any reductionist approach to reality.[1]

For Polanyi the meaning of a word-string is the Gestalt which we recognize focally from it, not the subsidiary particulars, the words, in terms of whose coherence it is recognized. These lose their meaning as soon as they are isolated from the whole, they cease to be transparent and become opaque, so that we can no longer look through them to the meaning. Dennett concedes (*CE*, 97) that 'you understand the word-string, and *mean* it'; he accepts that a subject's 'heterophenomenological world' does in some sense exist. (He defines this as 'a stable intersubjectively confirmable theoretical posit, having the same metaphysical status as, say, Sherlock Holmes's London' (*CE*, 81).) But he regards it as in itself a sort of intermediate fiction; its phenomena do not exist as real objects, events and states in the brain or elsewhere. We have to go behind them to get to the material realities which cause them. This immediately raises the question of what the status of a 'phenomenon', a 'fiction', or an 'abstraction' is in the real world; but Dennett's only reply would be, if I understand him correctly, that it is no more and no less than the underlying brain events which cause it; there is nothing else to be identified.

Dennett also denies, and this time explicitly, the idea, which lies near the core of Polanyi's theory of personal knowledge, that events or phenomena have to be grasped from a personal point of view. He speaks of the 'third person perspective', but he does not seem to mean by this a particular third person's perspective, rather an 'all persons at once' perspective. He will not accept Thomas Nagel's claim that 'the attempt to give a complete account of the world in objective terms detached from these perspectives' is vain (*CE*, 71). This attitude is based on an account of the brain that includes no counterpart to the step-by-step predications or tacit integrations which in my account represent the basic activity of consciousness. Such a simplification excludes the need for what Kant would call a synthesis, 'uniting representations in one consciousness' and in turn implying the need for a point of view, that of the 'transcendental subject of thought'. But the question remains whether, by excluding all this, Dennett does not also deny any effective reality to consciousness altogether; whether he does not in effect turn it into a mere 'theorist's fiction'.

ELIMINATING THE 'CARTESIAN THEATRE'

Dennett identifies any suggestion of a point of view with the idea of a point moving steadily through space-time and constituting for the subject a continually changing 'Cartesian Theatre', 'a place where "it all comes together" and consciousness happens' (*CE*, 39). According to this model, he says, 'our conscious minds are located at the termination of all the inbound processes [of the brain], just before the initiation of the outbound processes'. Such a model, however, demonstrably does not work, because what we recognize is always the product of many different 'content fixations' which occur over a 'smear' of time and space. Instead he proposes a 'multiple drafts' model of the brain. The basic units of activity are content-fixations, otherwise feature discriminations, which are precisely locatable in space and time, but do not necessarily become conscious. They form a narrative stream with multiple channels, which is subject to continual editing by specialist circuits, working in a sort of competitive pandemonium to create fragmentary drafts of narrative. Thus at any time there are in existence multiple drafts of narrative fragments at various stages of editing in various parts of the brain. This is the multiple stream not only of conscious experience, but also of memory. The process of experiencing is not separable from that of editing, recording and (frequently) forgetting. Most of the fragmentary drafts 'play short-lived roles in the modulation of current activity', and presumably then disappear; but others are 'promoted to further functional roles' (*CE*, 254) and become, if I understand the model correctly, narratives relevant to the modulation of activity at higher levels of organization and over longer periods of time. Probing this multiple stream at different times and places precipitates different narratives from the subject; and it is emphasized that there is no final or canonical narrative, reflecting what actually happened, as distinct from what is thought at various times to have happened.

Dennett devotes much space and ingenuity to demolishing the Cartesian Theatre as he conceives it. 'One can always "draw a line"', he says, 'in the stream of processing in the brain, but there are no functional differences that could motivate declaring all prior stages and revisions to be unconscious or preconscious, and all subsequent emendations ... to be post-experiential memory contamination' (*CE*, 126). (I do not know whether Descartes would ever have wanted to make such a declaration, but it seems to me

inconceivable that Kant would have done; and I think it is unfortunate that Dennett virtually never looks beyond Descartes and Hume to Kant.) 'Probing the stream', he goes on, precipitates a narrative, and what is criterial for consciousness is 'writing it down' in memory. 'That is *what it is* for the "given" to be "taken".' 'There is no reality of conscious experience independent of the effect of various vehicles of content [which I take to be fragmentary narratives] on subsequent action (and hence of course on memory)' (*CE*, 132).

'An element of content', he suggests, may become conscious 'at some time *t*, not by entering some functionally defined and anatomically located system, but by changing state right where it is; by acquiring some property or by having the intensity of one of its properties boosted above some threshold' (*CE*, 166). In this manner a 'representation', consisting of an organized association of such elements, could exceed a threshold of activation over the whole cortex or large parts of it. This would be a shift in the mode of action of the brain to the mode of consciousness. It would involve a judgment of simultaneity and sequence between the elements, but this would not be a Cartesian moment of consciousness, it would itself be a representation in the brain of the temporal properties of the elements concerned. Whenever we report that something has happened to us, we are not directly reflecting a brain event, we are reporting a judgment made about what has happened. The mode shift might be observed from the outside by a scientist with his instruments at a precise moment, but there is no inner observer to do the same from the inside. What matters for the individual is how the 'objective simultaneities and sequences of events spread across the broad field of the cortex' are taken up by the brain to be 'incorporated into the processes of ongoing control of behaviour'; and this 'must be only indirectly constrained by cortical timing'. The suggestion is that this incorporation of simultaneities and sequences of events into the processes by which behaviour is controlled (and Dennett seems to be thinking here in cybernetic terms of the organism as a self-regulating system) is itself what we think of as the stream of consciousness (*CE*, 166).

In this manner Dennett eliminates not only the Cartesian Theatre but also the Cartesian audience, which is the soul or self. Since he rejects the need for any particular perspective, he also eliminates by implication even Kant's 'transcendental subject of thought', the featureless point of view or vanishing point from which the volume

of space-time in which we perceive or think at any moment is projected. Thereby he eliminates any point of access for the person, however conceived, to the data of consciousness.

THE MIND AS A 'VIRTUAL MACHINE' IN THE BRAIN

How then are these 'processes of ongoing control of behaviour' to be identified? Dennett suggests that historically they developed in two stages. The brain itself was evolved as a system of many specialized circuits, a sort of anticipation machine, designed to perform such essential tasks as ducking, predator-avoiding, face recognition, grasping, throwing or berry-picking. These capacities are part of our animal heritage and are mainly innate ('hard-wired'); but they incorporate a considerable degree of plasticity. It would often have happened that given patterns were opportunistically enlisted in new roles. The amount of design they offered would thus have been augmented by 'micro-habits of thought' developed partly through the individual's own experience and partly through 'the pre-designed gifts of culture'. This is learning. The evolution of the human brain itself was probably almost complete before the advent of language; but in the second stage of development (which was remarkably rapid in evolutionary terms) the habit of communicating useful information developed into a capacity to talk or think to oneself, and so to establish new connexions and new patterns of neural activity even on one's own. In this fashion in each individual thousands of replicable ideas,[2] borne mostly by language but also by wordless 'images' and other data structures, began to take up residence in the brain and turn it into a mind (*CE*, 190–9, 254).

This mind takes the form of what computer scientists call a 'virtual machine', a pattern of rules, otherwise transition regularities, impressed as a program upon the plasticity of the brain. It has a 'von Neumannesque' structure, much like that of an ordinary computer, except that there is no division between the memory and the central processing unit. The virtual machine imposes a serial form of operation – a stream of consciousness – upon the 'parallel hubbub' of the brain (*CE*, 214), and anyone or anything possessing such a machine possesses consciousness (*CE*, 281). It develops somewhat differently in each individual, though there are many

resemblances when the individuals share a language and culture. The stream of consciousness is generated not by formal algorithms, but by a more rambling, competitive process. Dennett leans towards a model in which words and phrases, 'together with their sounds, meanings and associations jostle with grammatical constructions in a pandemonium, all "trying" to be part of the message' (*CE*, 240). On this basis he abandons the idea that a thinker begins with a determinate thought to be expressed, in favour of the alternative that 'mumbling takes on shapes' (*CE*, 245). There is in any case no Central Meaner; the lead is taken by continually shifting and competing coalitions within the pandemonium. They end up as the executed intentions, not of any Inner Conceptualizer, but of a Global Conceptualizer, the person, of whom the language production system is only a part (*CE*, 251).

One of the puzzles that an anatomically based theory of consciousness has to face is, according to Dennett, that the brain seems to have only one global workspace, the cortex, with no separate facilities for long term memory. His tentative solution to the problem is that an individual element of content in the cortex may have, in addition to its specialized semantic role, a secondary representational role as a sort of available pixel, based on its functional location in the network. That is to say, it is a kind of dot with two values, on or off, which can be used with others (like the grains of a photographic emulsion) to build up a picture in a 'dot matrix'. The fact that we can represent things to ourselves in a hypothetical way is of great practical importance in consciousness, and some mechanism of this sort may, he suggests, underlie our capacity to do so. Spatial images are represented in the brain in the virtual space of a 'bit-map', though the brain has various ways of economizing on the amount of processing involved. Human vision has remarkable pattern-recognition capabilities and in order to extract information it is often helpful to make use of diagrams, which amount to a representation of the information, not to an inner eye, but to an inner pattern-recognition mechanism (*CE*, 293).

LANGUAGE AND THE PRESENTATIONS OF CONSCIOUSNESS

Words, on Dennett's construction, are catalysts that can precipitate fixations of content as one part of the brain tries to communicate

with another. The structures of grammar shape the ways in which we probe our data bases and so elicit the thoughts and words we need. The details of a natural language constrain the operations of the brain in the manner of a high-level programming language, though there may be a lower-level inbuilt language of thought (like the 'machine language' or 'assembly language' of a computer) at a deeper stratum of the brain (*CE*, 301–3). He cites the suggestion of D. Rosenthal that we think at two levels, of which the second does not have to be conscious. This analysis relates to a distinction between a thought or belief unconsciously held (and sometimes unconsciously expressed, for example in body language) and a related higher level thought. The latter shapes a conscious report and so constitutes a speech act or a comparable non-linguistic form of expression (which need not always be overt). The distinction does not exactly correspond to the one made by Polanyi between focal and subsidiary knowing, but there is an interesting degree of convergence between the two. Dennett stresses, I believe rightly, that the unconscious and conscious states are not successive: 'The emergence of the expression is precisely what creates or fixes the content of the higher order thought expressed' (*CE*, 315).

It is at the interface between the conscious states of reporting and the unconscious states of expressing that in Dennett's view the presentations of consciousness take place; and this emphasizes his point that they do not take place at any single location. The 'observer' is replaced by interactions between different parts of the brain. But how are particular objects picked out for reporting? Dennett suggests that when some elements enter the pandemonium, they merely produce a one-shot effect rippling through the system, which is too evanescent to be reportable. To become reportable the object has to become separated out, as figure from ground, by a series of 'feedback-guided, error-corrected, gain-adjusted, purposeful links' (*CE*, 335). This process would correspond, on my account, to the selection of subsidiary particulars from the 'cloud of resonance' which is the active unconscious.

Prosthetic devices have been developed to enable some blind people to 'see' through a TV camera connected to an array of vibrating tinglers forming a pad of pixels on the subject's back. Awareness of the tinglers as such soon drops out, they become transparent as it were, and the subject's point of view shifts to that of the TV camera mounted on his head. Dennett suggests that if the degree of resolution could be improved sufficiently the subject's

experience would be more or less the same as actual seeing. As it happens, Polanyi gave a good deal of attention to similar prosthetic phenomena such as the use of tools, as evidence of the way in which the individual meanings of subsidiary particulars become transparent as they acquire new meaning in relation to the whole in whose coherence they participate. Dennett's interpretation is reductionist – the whole is nothing but its parts; seeing is nothing but the relationships of pixels in virtual space. In contrast Polanyi's interpretation is holistic; for him true knowing is always focal knowledge of a whole in which subsidiary particulars cohere.

Our visual field always seems to be complete, although we have a significant blind spot in the middle of it. Our seeing always seems to be continuous in time, although our eyes are in fact constantly shifting from one fixation to another. Such phenomena are usually explained as a matter of 'filling-in' by the mind; but Dennett argues, with some experimental evidence, that consciousness (though I would prefer here to say what underlies consciousness) is in fact frequently full of gaps; the apparent continuity of which we are aware is an indication, not of filling-in, but of the benign insensitivity of the mind, its capacity to ignore and neglect what is inessential to its purpose – including the sliding confusion of retinal impressions during the 'saccades' between one visual fixation and the next. If you begin to read a sentence on the page, you assume that all the words which are within your total visual field but outside the focussed area are present in the background; but they are only 'virtually' present; very little detail is registered outside the central area (*CE*, 356). Consciousness seems to be a continuous plenum, but it is not, it is full of gaps (*CE*, 366). One's report that it is continuous, like all one's reports of phenomena in the 'Cartesian Theatre', is false, it is made of 'figment' instead of judgments.

A COMMENT ON LANGUAGE

This account of the limitation on the amount of detail we can take in at any one time may be compared with my theory that a perceptual form in metric space has to be projected upon a conceptual form in the much more impoverished quasi-topological space of thought before it can become conscious; and that consequently what we consciously notice comprises much less detail than what

in a sense we actually see – than what is taken in by our perceptual apparatus. This argument is given added emphasis by the fact that a single conscious perceptual predication normally relates to the input of several visual 'saccades'. To a large extent Dennett's account and mine may be complementary, rather than mutually exclusive; but it seems to me that he fails to recognize, even in his own terms, that consciousness of an apparent plenum (figment or no figment) reflects a higher level *judgment* than there *is* a plenum bringing other judgments together in a unity. And this omission is perhaps to be expected, since in principle he denies the possibility of synchronic continuity (as in a form or plenum) because he is committed to a digital model which can reflect only what is sequential or else discretely simultaneous, not what is truly and synchronically continuous.

A further conflict arises over Dennett's denial that there is any language of thought representing in effect the language of consciousness. The life of consciousness, he suggests, consists of judgments, otherwise context-fixations, distributed in time and space in the brain. They can have the effect of informing various processes with their content; but this content does not have to be expressed in 'propositional form' – corresponding, I suppose, to what I would call predicational form. Some of these content-fixations, he says, have further effects which eventually lead to the production of sentences; but to ascribe 'propositional form' to the processes of conscious thought is 'a mistake, a case of misprojecting the categories of language back on to the activities of the brain too enthusiastically' (*CE*, 365).

This assertion goes directly against the views expressed in Chapters 2 and 3 of this book. Verbal and other forms of articulation in my view (and in Polanyi's) exist to serve thought, which is the awareness of meaning. They are not identical with thought, even though they may often help to sharpen and develop it. Meaning does not necessarily have to be formalized; but my argument is that, although we can become directly aware of something without any analysis of what it consists of, even such an intuitive awareness takes shape as a predication; that is to say, a synchronic subject form is grasped as figure, in relation to another synchronic predicate form, as ground, in a space, over a transition in time. This step of consciousness is a tacit, inarticulate process, but it is already grammatical. It can be formalized and made articulate if the forms are analysed into components and sub-components within the basic

predicative framework; and this can be done with the aid of images, diagrams, words or other forms of symbolic representation. In the case of words and other serial, one-dimensional forms of representation, however, the interrelations of the components cannot be directly shown in space and so a 'particular grammar' of language, as distinct from the 'general grammar' of thought has to be elaborated to enable them to be translated back from a linear sequence into the multi-dimensional representations of consciousness. Such articulation, in words or otherwise, can be of enormous value in facilitating dialectically the processes of thought in the manner described in Chapter 2. But it is simply putting things the wrong way round to suggest that the predicational pattern of thought mirrors or is created by language, rather than vice versa. As Polanyi expressed the point, a formal step can be valid only by virtue of our tacit confirmation of it (*PK*, 131).

QUALIA

Curiously Dennett does not directly confront the problem of forms, presumably because he thinks that the computer's capacity to approximate them as coordinates is sufficient to reduce them to digits (which it is not). But he does tackle head on the problem of qualities, and he does so with his usual prestidigitation, by causing them to disappear.

Dennett uses the philosopher's term 'qualia' (sing. 'quale') to refer to properties corresponding roughly to what Locke called secondary qualities – colour, sound, taste, smell, feeling and so on. Sensory inputs of various kinds, he says, cause the brain to go into appropriate discriminative states, in which it makes judgments about their primary properties ('mechanistic properties due to their connections, the excitation states of their elements, etc.'). In virtue of these primary properties they have various secondary, 'merely dispositional', properties, which cause humans to express verbal judgments alluding, for instance, to colour. 'When someone says [referring to an optical illusion] "I know the ring isn't really pink, but it sure seems pink", the first clause expresses a judgment about something in the world, and the second clause expresses a second-order judgment about a discriminative state' (*CE*, 373). The judgments of phenomenal quality which we make are judgments about judgments.

Thus a judgment about the colour of an object is derived from external reality, but at a remove. We compare the direct discrimination with a remembered discrimination – a memory image, which is a classifying category derived from past experience. These classifications, however, do not simply register differences in the wavelengths of reflected light; the fact is that different physical factors or combinations of factors can sometimes lead to the same colour judgment. How does this come about? Because our capacities for colour detection were evolved, not as scientific instruments, but *ad hoc* to enable us to identify useful things, such as red berries. As a side effect they also labelled a lot of other things, but this was a matter of chance and useful flexibility. Different animal species have evolved very different 'colour spaces'; and human colour judgments vary considerably, not only according to the physical make-up of the individual (who may be partially colour-blind without knowing it), but also according to the needs and conventions of the culture to which he or she belongs. However this does not alter the fact that for each individual they have a constancy which is not directly correlated with physical reality: when you put on lightly coloured sunglasses you soon adapt to seeing very much the same colours as before.

Thus for Dennett colour is not a physical reality at all. Qualia, including such qualities as loveliness, cannot be defined independently of the dispositions of a class of observers. They are subjective and relative. They also often carry, for the same reasons of evolutionary advantage, loadings for enjoyment or aversion. But the qualia yielded by particular objects or occurrences are capable of great variation according to the personal experience and cultural environment of the individual concerned. It is impossible now for anyone to hear a Bach cantata as a Leipziger of the 1720s would have heard it. Qualia are in fact complexes of dispositions (which I take to be the same as complexes of judgments about judgments), largely idiosyncratic to each individual, though all individuals have them. They are not to be separated out as additional to these complexes, nor does it make any sense to talk of them as epiphenomena, parallel to the real world but separate from it.

Dennett's discussion in this area, as often elsewhere, seems to me effective up to a point and within its own terms – though much of it is devoted to setting up straw men with 'qualophile' views and rather easily knocking them down. He shows in effect that our knowledge of qualia is, to use Polanyi's terminology, personal

knowledge. But his complementary assumption that our knowledge of primary properties can, on the other hand, be strictly impersonal carries no conviction at all; and this means that the wider structure of his argument falls apart.

My own rather different approach to qualia was outlined in Chapter 4. I suggested *inter alia* that precise qualities and intensities of experience cannot be specified in the terms in which we actually become conscious of them. Although a scientist may be able to measure and specify with his instruments the conditions which give rise to them, he is in the process translating the experience out of the categories in which it is consciously recognized. Dennett would say that he is translating, or reducing mere figment – for example the colours of the rainbow – into an underlying reality. It is interesting that, in spite of differences of approach, it could be said of my model, as of his, that discriminations of qualia are judgments about judgments – in my case judgments about the collective and simultaneous impact of a multitude of other (unconscious) judgments, taken as it were in solution, or in enfilade. But the crucial issue between us is that of whether the sensation of bright red, the feeling of pain, or the emotion of joy, can in fact be reduced without remainder to digital brain events. In my view the scientist's description of events which we recognize as qualia is an abstraction from past conscious experiences (whether his own or other people's). It may be a valid, sometimes an extremely useful description; but it depends on the experience of conscious predications, which by definition include qualia, and not vice versa. Ultimately it is the colours of the rainbow which carry reality to us, not the mere 'pointer readings' which, as the physicist Sir Arthur Eddington said, form the subject matter of exact science.

SELVES

Dennett does not deny the existence of selves, he talks a good deal of sense about them. I find myself in agreement with a considerable part of his discussion of the subject, though I think there are some major gaps and inadequacies in the later stages of his account.

For Dennett selves originate in the recognition of a boundary (sometimes rather shifting or permeable) between a living being and

the rest of the world. Human beings however not only have boundaries to define them, they are constantly representing themselves with the aid of words, which they spin into self-protecting strings of narrative. We are constantly concocting and controlling the stories we tell others, and ourselves, about who we are. But in the end it is these stories which create our human consciousness and our 'narrative selfhood'. They seem to issue from a single source, but in fact there is no unified agent, no little man or homunculus, within, only a shifting 'centre of narrative gravity' – which is itself no more than a convenient abstraction, like the convenient concept of the centre of gravity that engineers use (*CE*, 414–18).

There are cases, he continues, of people with Multiple Personality Disorder who seem to be inhabited by different selves at different times; and this tends to support the suggestion that a self 'can be gappy, lapsing into nothingness ... only to be rekindled at some later time'. As Derek Parfit has argued, selves are like clubs, 'not independently existing soul-pearls, but artifacts of the social processes that create us' (*CE*, 423). A self is an abstraction defined by the myriads of attributions and interpretations that have composed the biography of the living body whose Centre of Narrative Gravity it is. (Dennett thus takes it that the continuity of the self is defined by the continuity of the body, a point on which I tend to agree with him, though it should be noted that Parfit, to whom he refers, takes a different view.[3]) We build up, he says, a defining story about ourselves organized around what he calls a sort of basic blip of self-representation; but he emphasizes that this is not a self, it is just a representation of a self, that is to say of a Centre of Narrative Gravity.

If this self is not a real thing, what happens to our moral responsibility? Does it not mean that we can never get beyond a series of bureaucratic homunculi, who always reply very neatly when challenged 'Don't blame me, I just work here'? Dennett poses this question, but the only answer he can give – to my mind a quite inadequate answer – is that the task of constructing a self who can take responsibility is a major social and educational project (*CE*, 429). What this implies is that he is a social determinist, believing that it is possible to create from the outside an individual who will then have free will and moral responsibility from the inside, a sort of independent robot. Apparently he would not accept that we already have moral responsibility, Here and Now, even before his major social project has got under way. I will not go further into the

matter here, but there is a long and careful argument about the extent to which the self is and is not a social construction in my *Seeing Man Whole* (pp. 203–36).

In concluding his discussion of the self, Dennett refers briefly to the question of the potential immortality of the self. If you think of yourself as a Centre of Narrative Gravity, he says, your existence depends on the persistence of that narrative, as the organization of information that has structured your body's control system; and such an organization, or program, could in theory survive any number of switches of medium. This, he claims, is much easier to envisage than postulating your potential immortality as an inexplicable property of soul-stuff. It may be; but neither formulation has in fact much to do with the life of the resurrection as St Paul, for example, speaks of it.

ANOTHER VIEW OF SELVES

I find it difficult to make any brief comment on what Dennett says about the self. He claims (*CE*, 454) that only the most threadbare alternative models of the mind to his, or those like his, are available – by which he means models not based on materialism and artificial intelligence (AI); while for my part I have to say, not only that he is unwise to denigrate such models as that of the neuroscientist Gerald Edelman, to which I shall be turning shortly, but also that I believe I can offer a far more detailed, precise and comprehensive model than anything he has proposed, particularly so far as the self in its various aspects and meanings is concerned. A brief account of some of the main features of this model are given in the paragraphs which follow.[4]

A distinction was drawn in Chapter 2 of this book between idea complexes in the mind-manifold, often of immense richness and complexity, and the much simpler ideas evoked from them as relevant to the context on particular occasions; between, for example, all that the word model could mean to us in potentiality and the meaning it conveys when mentioned Here Now. One of those idea complexes, and the one which dominates and links together the whole manifold, is that of the self; and in this case, as with the others, I would draw a distinction between the stored complex, which comprises an immense deposit of memories, thoughts and

associations, and the specific idea *representing* that complex which is evoked every time we think of ourselves. This evoked idea or profile of the self takes a different and unique form each time. Some features of the idea complex of the self may be repressed in such a way that they are not available directly to consciousness, but even these can contribute, when relevant, to the cloud of association evoked, and so to the emotional colouring of the individual's experience.

A significant proportion of the complex is made up of ideas which are more than thoughts or memories, because they reflect plans already adopted but not yet acted out to completion, which inevitably exercise some constraint over any future decisions that we may want to take. The constituent ideas of the self could all in some sense be described as narratives or stories (here I agree with Dennett). Every time we take a decision, we adopt a plan which stretches on as a story into the imagined future, sometimes for a few seconds, sometimes for many years. If all our decisions were taken independently, great confusion could follow; so the mind builds together all of its plans which could still constrain future decisions into a more or less coherent structure – an idea complex within the greater idea complex of the self – which I call the anticipating self. This is a sort of bundle of stories fraying out into the future, but a bundle which is ordered in the sense that broadly the shorter term stories are fitted within the existing longer term stories (and excluded if they do not fit), and similarly the more particularized stories are fitted within the more generalized. The function of this structure, is to ensure that whenever a decision comes to be made, the temporary responding self of the occasion takes account of past decisions that may affect it.

Many of the plans we adopt are acted out to completion, successfully or otherwise, and thereafter they cease to be part of the anticipating self, they just become ordinary memories. But we have all been taking decisions since babyhood. At any time the anticipating self consists of a very large number of stories, some of the most general and lifelong kind, some much more particular and short term, all of which are fitted loosely together in ramshackle fashion, like a system of overlapping scales. They include not only the stories we tell ourselves, but also stories we tell other people in presenting ourselves to them. These may not coincide exactly with our inner thoughts, but they nevertheless have some binding force; we need to live up to what we claim to be. Beyond this they also

include stories corresponding to the operational social roles to which we are committed, including those involved in earning a living. These are not always roles that we particularly like, but if we fail to perform them, there will be a penalty to pay.

Every time we take a decision, a profile of the anticipating self is evoked, which is derived by a sort of resonance from those elements that are relevant in the situation, and this forms the temporary, responding self. By taking a decision we adopt a plan, and this plan has to be matched to the profile of the self in that situation. If the two are incompatible, one or the other has to give: either we alter or abandon the plan, or we alter or abandon some feature of the self previously adopted. The diagram at Figure 1, though inevitably over-simplified, gives an indication of how a relatively restricted profile, or responding self, is evoked in a particular situation by resonance from the complex of the anticipating self, which is a part of the mind-manifold or memory store; and how thereafter the responding self becomes one of the elements to be fitted in to the immediate progression of predications in real time in the consciousness of Me-Here-Now, and thereby affects the behaviour which may or may not follow. (I should perhaps add at this point that if Dennett's theory of a fictional but useful Centre of Narrative Gravity corresponds to anything in my model, it corresponds to the anticipating self, and the ideas evoked from it on particular occasions; but in my view his theory is curiously indefinite and offers no effective explanation of what happens.)

So far we have distinguished the total idea complex of the self; within that the anticipating self; and within that the self of plans, the self of presentation and the self of operational roles; and we have distinguished from all of these the profile of the self evoked on a particular occasion, which may draw on any or all of them. In addition to these, however, we must not forget Kant's transcendental subject of thought, to which I have referred earlier, that is, the quite different self of the successive vanishing points from which the predications or syntheses of consciousness are projected. This corresponds closely to Piaget's 'centre of functioning'. Kant said of the transcendental ego that it cannot be represented as the predicate of another thing and so it remains 'quite empty and without significance';[5] but it remains nonetheless, in his view, the other side of the coin of consciousness: 'The Ego is but the consciousness of my thought'.[6] (Dennett of course tries to do without this self and the 'unity of consciousness' which it implies; but in my view he

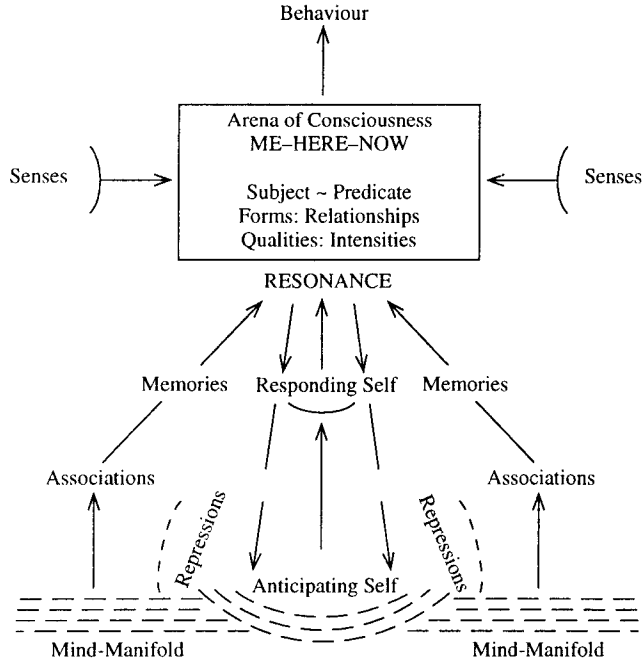

FIGURE 1 *Consciousness and the Responding Self*

This illustrates a predication, Me-Here-Now, in which a subject is realized focally in relation to a predicate over a transition in time. The bringing together of subject and predicate unifies in a coherent pattern the subordinate forms, relationships, qualities and intensities through the 'indwelling' of which the focal subject form is recognized. These 'subsidiary particulars' include the temporary, 'responding self' evoked in the resonance of this situation from the 'anticipating self', which is an extensive 'idea-complex' in the 'mind-manifold', or memory store. The responding self may contribute either as a subordinate form, a determinate element of the whole, or more diffusely as one of the elements, not separately recognized, which blend together to create the quality and intensity of the experience.

thereby undermines any attempt to give a convincing account of consciousness.) Moreover this is not the end of the story. It is also possible to distinguish what might be called the potential self, which is the self of test batteries, of traits and dispositions, of what Harré and Secord call our 'powers and liabilities' at a given time;[7] and beyond that the probable or predictable self, an idea of the self which others create on the basis of known facts about a person and

the person's own self-presentations. (In this connexion see Erving Goffman on 'The Presentation of the Self in Everyday Life'.[8])

What do all these selves have in common? The fact that they stand for something greater than themselves, what could be called the underlying self or the true person. And what is that? I believe it is simply the whole trajectory of a life in space and time from conception to dissolution, including all that ever happened to the person, and all that he or she ever thought, felt and experienced. Robert Nozick's 'closest continuer' theory of identity is relevant here.[9] Our true identity is defined by the four-dimensional form that we carve out through the world and history. Dennett does not develop this idea, but from the odd remark about the biography of the living body and about the Global Conceptualizer (distinguished from any putative Inner Conceptualizer) I have the impression that he might not dissent from it. Aquinas thought of the soul as the form of the body, and so in a sense do I, though the form is extended in time as well as space and includes the events of the whole mind–body system. I will not go into further detail about these matters here, but what I have said will perhaps be sufficient to show why in my view the theories of the self, or of multiple selves, offered by Dennett, Parfit and others, are far from adequate, even though there are elements in them with which I can agree.

In the final pages of his book Dennett returns to his central assertion that he has explained what consciousness is. I do not think he has done so and I will attempt in the next chapter to show why.

6

Ghosts in the Virtual Machine

A SUMMARY

Dennett is an excellent communicator of complex ideas, and his book of some 500 pages provides a useful conspectus of the current state of cognitive science, including a number of areas of controversy. Many highly specialized disciplines are involved and Dennett rightly makes it a virtue that he has tried, 'with unabashed eclecticism', to build a coherent theory, looking across the whole field. To summarize, his model of the mind is built from the bottom up, beginning with content-fixations. These are discriminations, otherwise patterns or integrations of the nerve impulses that provide the ones and zeroes of the parallel processing computer which is the brain, within this computer the mind is represented by a virtual machine, in effect another computer with a 'von Neumannesque' structure. The basic language of the virtual machine, a set of rules or transition regularities, is supplemented by the further constraints of natural language, functioning as a higher-level programming language. Under these constraints a serial stream of consciousness is generated, with some gaps, out of a sort of parallel pandemonium in which words, phrases, images, grammatical constructions and narrative fragments jostle together, as 'multiple drafts', competing to be part of the 'message'. The seriality is not 'hard-wired', but is the effect of a succession of coalitions of 'specialist circuits' operative in the multiple channels of the parallel-processing computer.

This process is shaped by the structures of grammar. Through a series of feedback-guided, error-corrected, gain-adjusted purposeful links particular elements are separated out from the parallel hubbub and emerge into awareness as conscious reports, as distinct from unconscious expressions. Consciousness arises, not at any one location in the brain, but at many locations where an interface is

established between different elements, and where the 'given' is 'taken'. The given includes not only various simultaneities and sequences of events, but also the qualia which are complexes of dispositions, that is, of judgments about judgments. The given has to be 'represented' on the occasion of any particular 'probe', and this is perhaps achieved through a system by which elements of content can also have secondary representational roles as quasi-pixels by virtue of their 'functional location' in the brain.

How then is the given taken? Dennett is positive that the process of uptake is scattered, not unified; there is no Central Meaner of Inner Conceptualizer. Nevertheless we are dealing with a single system which, in order to survive in the world, has to establish purpose and function as a whole. Although he does not say so explicitly, I think that for Dennett the higher level thoughts which are the takers represent different narratives about the self, picked out by the mysterious Centre of Narrative Gravity. They abut in the executed intentions of the Global Conceptualizer, whom I take to represent the organism as a whole. Dennett describes himself at one point as a 'teleofunctionalist' (*CE*, 460) and I think this reflects a conception of the organism as a self-regulating system establishing goals and trying to achieve them; but he says very little about the purposive life of the organism as distinct from the cognitive processes of his virtual machine.

Dennett argues, against John Searle and others, that while obviously no ordinary software program could achieve consciousness, there is no reason to doubt that one could do so if it was a sufficiently 'sophisticated and multilayered system, brimming with "world knowledge" and meta-knowledge and meta-meta-knowledge about its own responses ... and much much more' (*CE*, 438). All that is required is more of the same. Understanding is a property which can emerge from lots of distributed quasi-understanding in a large system. On a different tack he argues against Thomas Nagel that it is not impossible to imagine what it is like to be a bat; and interestingly his argument here finds a partial parallel in Polanyi's suggestion that 'our understanding of the hungry animal choosing its food, or of an animal on the alert listening, watching and reacting to what it notices is an act of personal knowing similar in structure to the animal's own personal act which our knowing of it appraises' (*PK*, 364).

THE THEORIST'S FICTION

My own model of the mind is built from the top down, rather than from the bottom up. It begins from the organism as a self-regulating system, from the mind as its regulator, and from the predicative steps of consciousness through which the process of regulation is put into effect. When it comes to what we know and act upon, the object of our focal knowledge, as Polanyi said, is always the whole, the comprehensive entity, not the supporting particulars which become known to us only subsidiarily, in terms of their coherence in the whole. Dennett, in contrast, begins from basic brain events and reduces all consciousness to them. For my part I certainly would not deny that mental events are linked in some sense with brain events, or that the brain has many of the characteristics of a computer. I find it encouraging that my top-down model, though far more detailed and specific, is compatible in many respects with Dennett's. I find his 'pandemonium' an interesting parallel to the 'cloud of resonance' from which, according to my model, the forms at the focus of consciousness are drawn, and which, through its collective impact, generates the qualities and intensities of experience.

The crucial point of division is marked by Dennett's assertion that his fundamental strategy is to develop an account of content that is independent of and more fundamental than consciousness, beginning from unconscious content-fixations and building an account of consciousness on that foundation (*CE*, 457). Our direct reports of phenomena in consciousness are often fallible, so Dennett moves downwards – and, as I see it, out of consciousness altogether – in order to arrive at a 'heterophenomenological world', 'a stable, intersubjectively confirmable theoretical posit'. The first step he takes is to treat a subject's report of experience as a text, which can be cross-checked and so can assume a quasi-objective status. The second step is to treat the text as the generator of a 'theorist's fiction' in the same way as the text of a novel can be used to generate a fictional world which is held in common by different readers, because it is 'determined by fiat by the text, exhaustively extrapolated as far as extrapolation will go and indeterminate beyond' (*CE*, 81). The third step is to try to arrive at what people are *really* saying by interpreting their utterances in the light of other information, much as a biographer

might explicate a novel in terms of events in the writer's life, or an anthropologist might try to explicate the religious myths of a tribal community. The fourth step is described by reference to the performance of a robot with a TV camera which is so programmed that it can push boxes about in response to written commands. The program searches for periodicities and progressions in sequences of ones and zeroes in the input, and responds to them selectively. That is what is really going on, not only in the computer but in us. We may think we are looking at images, but even if the TV monitor is switched off, the camera's input is processed just as before. We may think we understand something by intuition, but the truth is just that we have access only to a simplified end result, not to all the complicated things that are going on at a deeper level. The phenomena that we think we experience are just fictions generated by deeper processes that represent the reality.

What is the flaw in all this? Essentially, I suggest, in Dennett's need to refer to fictions, abstractions, phenomena and so on – ghosts which stalk about his virtual machine and which he has not succeeded in laying. I see no reason to deny that consciousness is subserved by deeper processes of which we are only partially, if at all, aware. But I do deny that what we experience at a higher level can be reduced without remainder to what is going on at a lower level. In Polanyian terms this is to equate the articulation with the meaning (e.g. *PK*, 87). Dennett does recognize that a 'multilayered' system is needed to deal with great complexities. But he remains a thoroughgoing reductionist, and so he cannot allow his ghosts to come alive. If we consider his own example of the 'theorist's fiction' to be generated from a text such as that of a novel, this amounts to taking the idiosyncratically imagined reality that a reader will create (and every reader will create differently) in filling out the text, and reducing it to a dry, intersubjectively confirmable lowest common denominator of what the text contains. The effect is desiccation and death – and this would be still more strikingly evident if the text was a poem. The life of a work of art lies in what we make of it, and what we make of it as a whole or a series of higher-level wholes, not in the dry bones of its materials or layout or other constituents; and this applies also to all our normal use of language. Even in the case of a legal statute, deliberately drafted to be 'intersubjectively confirmable', there is often need for creative interpretation by a judge before it can be applied in an actual situation.

These objections are all related to the centrally important fact, which Dennett, unlike Polanyi, seems to ignore, that information is not just 'an abstraction made concrete in some physically modulated medium', it involves a resolution of potentiality into actuality; and consequently, as Ashby the information theorist put it, 'the information conveyed is not an intrinsic property of the message.[1] This leads to the conclusion that the message is not strictly information at all until it emerges as the focal or 'distal' entity that gives meaning and coherence to a set of 'proximal' particulars which are 'dwelt in' by the mind. And even then, as mentioned in Chapter 4, it has to emerge within what I call the axis of generalization of a meta-message, within whose resonance, like that of the key in which we hear a tune, the meaning of the whole can be placed and understood. The 'heterophenomenological' text corresponds at best only to a generalized potentiality, which has to be made actual in the concrete instance; and this concrete actuality has to be created by the personal contribution of the individual receiving the message, or reading the book or whatever. All true knowledge is tacit and personal. I will return to the epistemological problems raised by this assertion in Chapter 9.

LEVELS OF BEING

According to Polanyi the conditions under which a principle can be made to operate lie beyond the control of the principle itself, and may be said to form its boundary conditions (equivalent, it might be said, to constraints in cybernetic terms). In certain cases the boundary conditions are subject to control by higher principles still. 'Thus the boundary conditions of the laws of mechanics may be controlled by the operational principles which define a machine .... And so we find that machines, purposive actions, grammatical sentences, and games of chess, are all entities subject to *dual control*' (*KB*, 217). The structure and functioning of an organism is determined, like that of a machine, by principles which control boundary conditions left open by physics and chemistry. Living beings consist in a hierarchy of levels, each having its own structural and organismic principles (*KB*, 219). Thus the logic of tacit knowing 'disposes of the Cartesian dilemma by acknowledging two mutually exclusive ways of being aware of our body' (*KB*, 223).

A boundary condition, Polanyi says, is always extraneous to the process which it delimits and harnesses:

> The fact that the effect of a higher principle over a system under dual control can have any value down to zero may allow us to conceive of the continuous emergence of irreducible principles within the origin of life .... Irreducible higher principles are *additional* to the laws of physics and chemistry. The principles of mechanical engineering and of communication of information, and the equivalent biological principles, are all additional to the laws of physics and chemistry. (*KB*, 231)

It may be relevant to recall here that Polanyi was himself an eminent professor of chemistry before he became a full-time philosopher. A boundary condition, he says, which harnesses the principles of a lower level to the service of a new, higher level, establishes a *semantic* relation between the two levels; the higher comprehends the workings of the lower and thus forms the meaning of the lower. The mind itself includes an ascending sequence of such principles; its appetitive and intellectual workings are transcended by principles of responsibility. Thus in sum:

> Mechanisms, whether man-made or morphological, are boundary conditions harnessing the laws of inanimate nature, being themselves irreducible to those laws. The pattern of organic bases in DNA which functions as a genetic code is a boundary condition irreducible to physics and chemistry. Further controlling principles of life may be represented as a hierarchy of boundary conditions extending, in the case of man, to consciousness and responsibility. (*KB*, 238)

Theories of the emergence of a hierarchy of levels of being are not new. Historically they go back at least to Lloyd Morgan in the nineteenth century. For many years now, and with increasing acceptance, Roger W. Sperry has been advocating a theory of 'mentalism' which is in many respects close to Polanyi's theory of levels of being, not least in accepting the idea of 'dual control':

> Evolution keeps complicating the universe by adding new phenomena that have new properties and new forces and that are

> regulated by new scientific principles and new scientific laws .... At the top, in the human brain, these include the powers of perception, cognition, reason, judgment and the like, the operational causal effects and forces of which are equally or more potent in brain dynamics than are the outclassed inner chemical forces.[2]

> Top-down control of the parts by the emergent whole is a core concept; it legitimizes consciousness and the subjective for science.

> The difference between mind and brain is the kind which exists between an emergent property and its infrastructure.[3]

For Sperry, although the emergent properties are non-reducible, they have no independent existence apart from the brain; and I have no reason to think that Polanyi would differ from him on this point.

John Searle, though he uses a different terminology, is another thinker who has recognized the emergence of different levels of being; but he is more typical of most contemporary philosophers and cognitive scientists in avoiding the idea of 'dual control'. He argues that the emergent property is both *caused by* the behaviour of what he calls micro-elements, and at the same time *realized in* the system that is made up of micro-elements. It is therefore not additional, as Polanyi would claim, to the laws of the lower level. The behaviour of micro-elements is sufficient to determine everything that happens. He accepts that top-down causation is a reality – our minds, for example, affect our bodies – but it only works because the top level is already caused by and realized in the bottom levels. Bottom comes first. At the same time he recognizes that psychologically we cannot do without the conviction of freedom; and this sets up a tension which, so far as I can see, he is unable to resolve.[4]

Polanyi's arguments in this field, like Sperry's and Searle's, are in the final analysis descriptive rather than fully explanatory. They cannot solve conclusively the problem of determinism, which I do not propose to discuss further here (though I will return to it briefly from another angle at the end of this book). But in the present context Polanyi was concerned primarily with the structure of knowing, not directly with determinism. His account has the particular strength of drawing upon a theory of tacit knowing which makes it clear that the 'comprehensive entity' gives meaning to the subsidiary particulars, rather than vice versa, and is never re-

ducible to them. His arguments cannot be conclusive because they run up against unsolved problems concerning the nature of our objective knowledge of the world; but they draw attention to realities which cannot be ignored. His theory of dual control, which he claims to dispose, *inter alia*, of the Cartesian dilemma by acknowledging two mutually exclusive ways of being aware of the body, itself has something of this descriptive rather than explanatory character. Searle indeed says something very similar without referring to the Cartesian dilemma. But it helps nevertheless to define a reality rather than to evade it, as some other theories do. Dennett on the other hand tries determinedly to exorcize the reality of one of these ways of being aware as mere fiction (whatever a fiction may be); but it will not go away.

THE UNITY OF CONSCIOUSNESS

I have already referred more than once to Kant's conception of the transcendental subject of thought as representing a sort of theoretical vanishing point, with no characterizing features of its own, but providing the point of view Here Now from which an arena of space and time can be projected or, to use Kant's word, synthesized. In this arena the objects of our thoughts and perceptions are located and related to each other. Isidor Chein has ingeniously compared the shifting notional or 'transcendental' viewpoint of the self with a body's shifting centre of gravity, which is closely linked to the continuous history of the body, yet on occasion can be located outside its boundaries.[5] This comparison seems to me a good deal more apt than Dennett's use of the same image to characterize a 'centre of narrative gravity'. So far as the arena of thought is concerned, it has been argued by R. L. Gregory that the discovery of non-Euclidean geometries in the nineteenth century destroyed any credibility that the Kantian idea of space as a necessary condition of consciousness might have had. But I would argue that on the contrary it is only the concept of a flexible, expandable, compressible, quasi-topological thought space, in which ideas, as non-perceptual forms, can be generalized, compared, manipulated and related to each other, that can make possible a coherent understanding of consciousness, and of the grammar through which it is structured.

I have discussed the walking motion of consciousness and the nature of predication in Chapter 3, and I do not propose therefore to go deeply into them here; but it may be appropriate nevertheless to emphasize that we cannot escape from the need for a point of view. Dennett asserts that we can, but he hardly presents any arguments on the matter; his 'heterophenomenology' is beside the point, since it merely concerns the possibility of obtaining an intersubjectively acceptable version of events. It does not alter the fact that, whatever version or events we are talking about, it can only reach consciousness when the material is synthesized into a predication – in Polanyi's terms, a tacit integration – by a particular person at a particular time and place, from a point Here Now. Otherwise there can be no consciousness,and without consciousness, however many 'modulations' may be buried in some memory or data base, there is no *available* knowledge, indeed there can be no passing of *information* in the true and precise sense.

It is also evident that every such occasion is unrepeatable, even for the same person, since whatever may be recalled is 'realized' with a particular resonance in a particular context which can never be precisely reproduced. This does not mean that there is no 'heterophenomenological' knowledge, rather that even what is 'intersubjectively confirmable' has to be derived ultimately from the conscious realizations of individual human beings, and can only be realized again by conscious human beings (with consequent variations which may or may not be important in the context). Even that sort of knowledge is personal knowledge; and personal knowledge, it must be recalled, is of the phenomena of consciousness, not of underlying brain events connected with them. Dennett's idea that by going behind consciousness he will be able to find something underneath that is more real than the phenomena of consciousness seems to me to be a fundamental misconception.

A sharp light is thrown upon this issue by an eminent scientist of the twentieth century, Erwin Schrödinger, commenting upon another from the fifth century BC. He quotes Democritus as saying that sensations are 'by convention' and that 'in truth there are but atoms and the void'. But he points out with another quotation that Democritus could also see that other side. Even though as a scientist he was an atomist, as a philosopher he was well aware of 'the epistemological limits, the one-sidedness, and the incompleteness of this materialistic world-view'. Democritus lets the senses answer back: 'Wretched mind, from us you are taking the evidence by

which you would overthrow us? Your victory is your own fall.' As we might put it, you are sawing off the branch on which you are sitting. Schrödinger himself says roundly:

> The traditional distinction between primary and secondary qualities of matter today belongs on the rubbish heap. Bodily dimensions and motions, and, say, so-called impenetrability, are not any more primary than are colour, taste and sound. If anything deserves the name primary, it is the sense qualities. The geometric picture of matter in space and time is a mental construct.

He concludes:

> One of the two thus seems irrevocably doomed to a ghostlike existence, either the objective external world of the scientist, or the self of consciousness which by thinking constructs the former, withdrawing from it in the process.[6]

This may seem a despairing comment, but it accurately states a dilemma which is still with us and is not to be circumvented by simply denying that it exists. Polanyi's view (comparable with Niels Bohr's in a different context) that we may have to acknowledge two mutually exclusive ways of awareness seems to offer the most truthful way forward.

PROBES AND PURPOSES

Dennett talks from time to time about 'probing' the database. The structures of grammar, he says, shape the ways in which we probe our databases (*CE*, 301); we probe the stream of multiple drafts at different times and places to produce different effects, that is, to precipitate different narratives (*CE, 113, 135).* But he has little else to say about probing and he himself suggests (*CE*, 169) that this 'metaphorical assertion' leaves a loose end in his argument. In my view it leaves more than a loose end, it leaves a gaping hole. For what his account implies, so far as I can judge, is that the occasions of probing are the occasions of consciousness. This must be one of the central functions of the brain. Yet he tells us nothing about it. When and why do we probe? Who or what does the probing? What

form does the process take? What is its function and what are its effects? In any book which purports to explain consciousness these are large omissions.

My own impression is that if Dennett were to develop an adequate theory of probing he would end up with something resembling the theory of predication sketched in Chapter 3. He would have to recognize that so long as we are awake we are continually making probes, or rather constructing predications, in unbroken succession; that each predication involves a span (or as he would say, a smear) of time and an arena (or smear) of one kind or another of space; that to be aware of the flow of time within one predication implies a static Now against which the flow can be recognized; that consciousness slips from Now to Now to Now; that the units of consciousness are completed predications, not any individual elements or content-fixations which may be identified within them; and much more.

Again Dennett attaches importance to the 'intentional stance, with its imputation of beliefs and wants' as characteristic of animals as well as human beings; he speaks of feedback-guided purposeful links as prerequisites for useful cognition; he uses language which suggest that he is thinking in terms of organisms as self-regulating systems; and he does have something to say about the self. But I have already given reasons why I think his account of the self is inadequate in many respects. It is hardly possible to give a satisfactory account of consciousness without placing it within a theory of the whole organism and what I have called the purposive cycles which it is not too much to say that consciousness exists to serve.

In short, although I think *Consciousness Explained* contains a great deal of useful information, fluently and often racily expressed, it certainly does not give a convincing explanation of consciousness. Above the lowest level of content-fixations, multiple drafts and pandemonium, the model which Dennett offers is sketchy in the extreme. And the main reason for its inadequacy, as it seems to me, is that he ties himself hand and foot from the outset with his prior assumption that 'somehow the brain must be the mind'. His materialism and reductionism in fact cut him off from consciousness. He begins from the wrong place.

7

An Evolutionist's Theory of Consciousness

THE BIOLOGICAL APPROACH

Gerald Edelman is a biologist and neuroscientist of great distinction and a Nobel prizewinner. There have been many striking advances in neuroscience in recent years and in his book *Bright Air, Brilliant Fire: On the Matter of the Mind* (*BB*)[1] Edelman presents, in a form accessible to the non-specialist, a remarkably clear and comprehensive account of the evolution, morphology and processes of 'the most complicated arrangement in the known universe'. This account is given structure and coherence by his Theory of Neuronal Group Selection (TNGS), which he develops to encompass a general theory of the mind and consciousness as well as of the brain.

Edelman claims that, in a qualified sense, he is a realist and a materialist; but he is a long way from the simple reductionism of Dennett and those who think like him. He rejects the computer analogy as a method of describing the brain, and rests his theory not on any abstract comparison but on the actual anatomy and functioning of the brain itself. He emphasizes the incredible intricacy of the brain. A large match head's worth of it contains about a billion connexions; and that is before you consider the uncountable billions of possible combinations of connexions. There are certain organizing principles which constrain its morphology: broadly the brain is made up of sheets that carry topographic maps and of rounded nuclei or 'blobs'. The cortex itself is an interconnected six-layered sheet of about ten billion neurons, with about a million billion connexions. But it is important to recognize that the brain is not 'hard-wired'; there is an immense amount of individual variation in the jungle of cells and their connexions, even between identical twins; and this alone is an argument against the computer analogy. Yet it is the physical arrangements of the brain – its 'dynamic morphology

all the way down' – on which its functioning depends. The function even of a single protein depends on its shape.

SELECTION AND RECOGNITION

In the course of evolution adaptation occurs by selection from populations of variants. Some variant organisms fit into a changed environment and survive; others do not and die. Selection depends on fit or recognition, which is defined as 'the continual adaptive matching or fitting of elements in one physical domain to novelty occurring in elements of another' (*BB*, 74).

Evolution, which is a selective system operating over immense periods of time, gives rise to other selective systems operating within the individual and over much shorter periods of time. One example is the immune system. The immune response involves molecular recognition of exquisite specificity; but it does not require the prior transfer to the recognizing system of information about the shape to be recognized; instead it generates a diverse population of recognizing antibody molecules and then selects *ex post facto* those that fit or match. Those that are selected are reproduced in large numbers to do their job and then die; but a smaller number which carry the recognizing shape are retained and form a kind of memory, so that the system can respond again very quickly if the same antigen is encountered on another occasion. 'Like evolution [the system] has a generator of diversity (the "jumbler" of DNA in each lymphocyte), a means of perpetuating changes by a kind of heredity (clonal reproduction), and a means of differentially amplifying selection events (differential clonal reproduction)' (*BB*, 78). Perhaps the crucial difference between Edelman's approach and Dennett's is that Edelman uses the analogy of the selectional mechanism of the immune system as the basis for his description of the operation of the brain, whereas Dennett uses the rule-following mechanism of the digital computer.

Edelman argues that the brain itself works as another selectional system, in which matching and selection take place in relation to an already existing diverse repertoire of units. The units of selection concerned are not the individual nerve cells. Each unit is a so-called neuronal group of 'cooperatively interactive neurons more or less tightly coupled by synaptic connections, firing together and

responding as units to selection by particular stimuli' (*BB*, 96). Such a group includes both excitatory and inhibitory neurons. A population of variant neuronal groups in a given brain region forms a *primary repertoire*. The genetic code imposes certain constraints on the wiring of such repertoires, but does not fully determine it. The organism develops epigenetically (with key events triggering other events); and the fine detail depends on statistically varying fluctuations of cell movement, cell process development and cell death, as well as on a matching of connexions which is related to the organism's activity. This form of development involves *topobiological competition* between populations of neurons competing for connexions, and this results in *somatic selection*.

BRAIN MAPS

The organism's behaviour causes synaptic connexions between cells to be selectively strengthened or weakened, and this in turn has the effect of carving out a variety of *circuits* which form a *secondary repertoire*. This is done without much elaboration of the anatomical pattern. To make possible the establishment of particular brain functions it is necessary for primary and secondary repertoires to form *maps*, which relate points on the two-dimensional receptor sheets of the body (such as the skin or the retina) to corresponding points on the sheets making up the brain. Although two-dimensional, the receptor sheets can carry spatial signals that relate to the three-dimensional world and can also take account of the time dimension. The maps preserve relationships of neighbourhood between different points, but not relative distances and angles; they may also, for example, be symmetrically rotated in certain ways, though without losing the correspondence of neighbourhood. I think it is fair to say that as a result they are maps of a quasi-topological kind (a link of some importance to my own theory of mental process).

PERCEPTUAL CATEGORIZATION

Different maps are linked by massive parallel and reciprocal connexions: the visual system of the monkey, for example, has over

thirty different maps for such functions as orientation, colour, or movement, and these are intricately connected to each other. Each map receives signals independently from the world, but the state of one map is correlated with the state of others by means of so-called *reentrant* connexions and signals. It is this reentrant function which, according to Edelman's theory, makes it possible for the brain to categorize different perceptions or aspects of perception, a capacity which underlies the whole power of thought. It does so by coupling the outputs of multiple maps to the sensori-motor behaviour of the animal. This creates a higher level structure called a *global mapping*, which allows events picked out on local maps through the selective activity of the sensory systems to be connected to motor behaviour. Thereby it leads to a continual matching of the animal's movements and posture to the independent sampling of several kinds of sensory signals. Sensori-motor activity over the whole mapping selects neuronal groups that give the appropriate output or behaviour and this, it is argued, leads to the establishment of categories or classes.

How are these decisions taken? Essentially on the basis of the statistics of signal correlations, *not* in accordance with algorithms or instructions of any kind. In other words we play around with ideas, as Hodgkin, and perhaps C. S. Pierce, would say,[2] exploring their possibilities, before coming to conclusions about categorization; we do not arrive at such conclusions by the systematic application of rules. But another factor has a vital contribution to make to the weighting of these decisions, namely the factor of value. Each global mapping has close interconnexions with non-mapped parts of the brain, in particular the hippocampus, the basal ganglia and the cerebellum; and these connexions add a loading for value which contributes greatly to the decisions which have to be made. The 'internal criteria for value' do not specifically determine such decisions, but they 'constrain the domains in which they occur'. They are themselves grounded in evolutionary selection for types of behaviour that match value patterns which help the brain and body to maintain the conditions necessary to continue life (*BB*, 94). Thus they correspond to what W. Ross Ashby, in discussing the nature of self-regulating organisms, or systems, described as the 'essential variables'.[3] Edelman calls them 'homeostats' (a word which Ashby used in the 1950s to describe his working model of an ultrastable system). It is the coupling of motion and sensory sampling, resulting in the somatic selection of neuronal groups, which

leads to behaviour that in turn changes the levels at which homeostats are set. 'Categorization is not the same as value, but rather occurs *on* value. It is an epigenetic developmental event' (*BB*, 94), that is to say one which takes place in accordance with the step-by-step development of the organism, when appropriate preceding events have occurred to create a trigger situation. An example of such an event might be, I suppose, the animal's recognition of a category corresponding to the form of a snake as one which demands flight behaviour.

MEMORY

Edelman proposes that perceptual categorization, memory and learning constitute the fundamental triad of higher brain functions; and that they are in fact inseparable aspects of a common mental performance. Memory is the specific enhancement of a previously established ability to categorize. It is a system property, not a replica or trace coded to represent its object. Recall is not stereotypic, it changes in continually changing contexts as the structure and dynamics of the neural populations involved also change. Each time we recall some event we recognize it anew in a new perspective; we rephotograph it, as it were, from a different angle, and this both adds something to the memory and also probably changes in some degree what was there before. I would wish to add that when a particular categorization is frequently recalled, it usually happens that only a part of its whole potential is drawn upon – though the parts not drawn upon are still available for recall on other occasions when they may be more relevant. Edelman does not mention this point in the present context, but it clearly has a bearing on his later argument that categories can have fuzzy boundaries and thought processes depend to a great extent on metonymy – that is, allowing a part or aspect of a thing to stand for the whole.

Brain-based memory thus results from a process of continual re-categorization. Unlike computer-based memory it is inexact, but it is also capable of great degrees of generalization. It would however be useless if it could not in some way take account of the temporal succession of events; and this is achieved through connexions between the functionally segregated maps of the cortex and the three 'organs of succession': the cerebellum, the hippocampus and

the basic ganglia. The cerebellum is concerned with the timing of movements and the smoothing of successions of movements. The basic ganglia are concerned over a longer range with planning for movement and thus in choosing the types and successions of motor output. They are also intimately connected to the hedonic (limbic) centres of the midbrain and hypothalamus, which are concerned with appetitive and sexual behaviour and with evolved defensive behaviour patterns. Consequently, as we have seen, they are concerned with criteria of value, and they may possibly play a part in the focusing of attention. The hippocampus, which also has intimate connexions with the hedonic centres, plays an important part in relating short term memory to the establishment of long term memory.

CONCEPTS

Edelman firmly separates concepts from language – an important point on which I would strongly support him. In evolution, he says, conceptual abilities develop well before speech. An animal capable of having concepts must be able to connect one perceptual categorization to another through links that are generalized, not specific to particular memories. But, unlike elements of speech, they are not merely conventional, they do not require the user to belong to a speech community and they do not depend on sequential presentation. They could be described as conceptual categorization. The relations that are captured must allow responses to general properties – 'object', 'up–down', 'inside', and so on. They depend on perception and memory, but they are constructed by the brain from elements that contribute to both these functions. The TNGS suggests that in forming concepts the brain constructs maps of its own activities; the brain areas responsible 'contain structures that categorize, discriminate and recombine the various brain activities occurring in *different kinds of global mappings*' (*BB*, 109). They represent a mapping of types of maps.

These structures are probably located in the frontal, temporal and parietal cortices of the brain, which also have the necessary connexions to the basic ganglia and the hippocampus to ensure that values contribute to the process of conceptual categorization. Not enough is known to make it clear whether they depend on

topographic mapping as perceptual categorization does (but I would add that it is not evident what alternative there could be).

LEARNING AND PRIMARY CONSCIOUSNESS

Edelman defines learning as 'the means by which categorization occurs on a background of value to result in adaptive changes in behaviour that satisfy value' (*BB*, 118). It certainly occurs in animals that show no evidence of conscious behaviour. But in some animals, he suggests, perceptual categorizations can be bound into a *scene*, which is a spatio-temporally ordered set of events, some with and some without physical or causal connexions to others in the same scene. An example, I suppose, might be a tempting piece of cheese placed in a structure which a human being would describe as a mousetrap. The existence of a scene makes it possible for past learning, including past valuations, to be brought to bear on new events. It underlies the development of primary consciousness. In evolutionary terms new reentrant circuits make it possible to categorize concurrent perceptions conceptually before they become fixed as memories. The process goes on simultaneously in all sensory modalities, and this makes possible the construction of a complex, synchronic scene – and one which consists not merely of things, but of categorized things. The scene, by bringing things together, helps the animal to direct its attention effectively and to correct errors. Primary consciousness is a sort of remembered present; it is bound to 'a small memorial interval around a time chunk I call the present'. It lacks however any conception of the self and any ability to model past, present and future as part of the correlated scene. Although an animal with primary consciousness may have some element of long term memory (presumably as a kind of 'subsidiary particular', to use Polanyi's word), it will not have any explicit, focal awareness of such memory.

I attach great importance to the idea of the scene, which corresponds to what I call the 'arena of consciousness', or more precisely to the predications which take place in that arena and could be said to constitute it. The scene is the crucial element which Dennett has excluded, in his concern to avoid the taint of the 'Cartesian Theatre'. It is because he gives a central place to it that Edelman is able to get so much nearer to the reality of consciousness than

Dennett – though he is also much readier than Dennett to acknowledge that he is still not very near.

QUALIA

In Edelman's view, as this suggests, phenomenal experience arises from the correlation by a conceptual memory of a set of ongoing perceptual categorizations. He denies that there is any actual image in the brain: the image is a correlation. However, while this may be true, it does not get you very far towards understanding what phenomenal experience is; and Edelman is fair in recognizing the limitations that beset any attempt to deal with 'phenomenal or felt properties, otherwise known as qualia'. He describes qualia variously as personal or subjective experiences, feelings and sensations that accompany awareness; as phenomenal states; as 'how things seems to us'; and as discriminable parts of a mental scene that none the less has an overall unity (there is some resonance here with Polanyi). But he emphasizes that since qualia are experienced directly only by single individuals 'we cannot construct a phenomenal psychology that can be shared in the same way as a physics can be shared' (*BB*, 114). Yet in investigating consciousness, he says, we cannot ignore qualia; and it is relevant that subjective reports of qualia can be correlated with actions, brain structures and functions that can be objectively observed. It is clear, in his view, that different qualia are discriminated through differences in neural structure and behaviour in different sensory pathways. But he is not in a position to say how variations in phenomenal experience are related to these physiological differences.

His conclusion is that qualia, individual to each of us, are recategorizations by higher-order consciousness of value-laden perceptual relations in each sensory modality, or their conceptual combinations with each other (*BB*, 136). When translated into different language, this conclusion, it must be said, is not far removed from Dennett's 'judgments about judgments', or the theory developed in Chapter 4 of qualities and intensities as resulting from the collective and simultaneous impact of overtones, or of their equivalents in other modes. But the apparent implication that animals which only possess primary consciousness have no experience of qualia is much more open to question. And in any case the gap is

still not bridged. There is still no answer to the perfectly reasonable question: If the image is not in the brain, where is it and what is it? That is a question that no one can yet answer; and it is arguable that in principle, as Edelman implies in his reference to the impossibility of constructing a phenomenal psychology that can be shared, it may not be answerable at all, since phenomenal experience is itself a prior assumption of any sort of thought or speech.

At one point Edelman draws a distinction between feelings (which are qualia) and emotions, and suggests that emotions have strong cognitive components which mix feeling, willing and judgments in a complex fashion (*BB*, 176). They are not made simpler, he says, by the fact that they also have historical and social bases. His distinction is a shaky one, and could be said to rest on an incomplete analysis. In his own terms qualia have to do with categorization, and categorization has to do with value and hence with willing, priorities and shifts in the strength of synaptic connexions. I will not attempt to go further into the matter here, but I would draw attention to the section 'A Theory of the Unconscious' in Chapter 3 as an indication of the way in which I would prefer to approach the issue.

The only further comment that I would make here is that, although Edelman discusses qualia as if they were primarily feelings or sensations contributing to a scene, the problem of the relationship between phenomenal states and the brain structures and processes that underlie them does not apply merely to the qualities and intensities that are elements in the scene. It applies no less to the forms and relationships through which its complexity is structured, and so no less to the scene itself as a whole.[4]

HIGHER-ORDER CONSCIOUSNESS

Higher-order consciousness, unlike primary consciousness, involves the ability to model the personal, and the past and future as well as the present. It is characterized by direct awareness of mental episodes without any participation of the sense organs, and involves the consciousness of being conscious (*BB*, 112). It implies a being who possesses language and a reportable subjective life, in other words a socially based self. In the brain the self or internal systems arise from interactions between the limbic and cortical

systems, and this differentiates them from outside world systems that are strictly cortical.

In my judgment Edelman's distinction between primary and higher-order consciousness, although broadly justified, may need a little refinement. In primary consciousness there is no awareness of the self, but if the animal concerned is to synthesize a spatio-temporally ordered scene at all (and it is interesting that Edelman rightly uses the Kantian word 'synthesize' in this connexion), then it has to establish a point Here-Now which is not part of the scene, but from which the necessary space-time system can be projected. This implies something corresponding to Kant's featureless transcendental subject of thought – though it does not of course imply a conscious self. With the development of higher-order consciousness the self can come into view as part of the scene; but it may be worth emphasizing that people with higher-order consciousness (like you and me) are not explicitly aware of themselves for more than a small fraction of their lives. Most of the time they are unselfconsciously absorbed in the past, the present or the future, or in issues that do not involve any specific temporal location – possibly even in some limited scene which involves primary consciousness alone. We need therefore, I suggest, a threefold distinction between (i) self-consciousness, (ii) unselfconscious higher-order consciousness, and (iii) primary consciousness.

Two further points may be worth mentioning here. Edelman refers to the self as if it were entirely a social creation, a view which is widely held, but which I believe to be only partially true. (The matter is discussed in some detail in *Seeing Man Whole*, pp. 203–36.) Similarly he refers to the possession of language and a language community as prerequisites for the development of higher-order consciousness. This may be the case, but I think it could possibly be the other way round. In such cases, where two interdependent capacities are evolved, it is seldom possible to assign priority to either.

ATTENTION AND REPRESSION

In Edelman's view the capacity for selective attention was probably developed in response to evolutionary pressure for an animal to be able to entertain several possible actions and choose one of them. The

selectional mechanism required in the brain may be provided by the basic ganglia, whose output is inhibitory but can also be used to inhibit inhibition, and so to excite, or prepare for excitation, target areas in the cortex. Attention is crucial to the purposive or intentional nature of conscious animals. It compels them in effect to concentrate on one thing at a time, a procedure which is necessary in order to make sure that they do not make simultaneous but mutually conflicting decisions. Attention is thus not the same as consciousness, but it is associated with consciousness and the need for it may have been one of the reasons why consciousness was evolved.

The converse of attention is repression, a selective inability to recall, driven by an emotional need to avoid ideas and decisions that contradict the consciously adopted purposes of the self.

LANGUAGE

Edelman argues – rightly in my view – that a pre-existing capacity for concepts is necessary as a basis for the correlation of utterances with objects and so for the beginnings of speech (*BB*, 127). Meaning in language, he says, arises from the interaction of value-category memory with the combined activity of conceptual areas and speech areas. Syntax is built up epigenetically under genetic constraints; there are no innate, genetically specified rules for a universal grammar. However he confines his use of the words syntax and grammar exclusively to verbal language, and I believe this is a mistake. He suggests that in early humans the pre-syntactical organization of gestures may have permitted a simple ordering of nouns and verbs; but I would maintain that logically such an ordering already *is* a syntax. He suggests that the basis for recognizing subject – predicate relationships is the emerging distinction between self and nonself; but this appears to reflect a confusion between the personal subject, or self, and the grammatical subject which is the focus of attention.

More to the point would be an analysis of the process by which, according to his own theory, ongoing perceptual categorizations are spatio-temporally organized and correlated into a scene. I believe such an analysis would lead to the conclusion that this process is a form of grammatical structuring, based on the relation of subject to predicate, and that in fact it underlies all perceptual and conceptual consciousness. If concepts are to be separated from

language as Edelman maintains, so also, at its roots, should grammar be separated from language; for concepts can be built together into more complex concepts without the aid of words. The basic rules of the universal grammar that I am proposing have been discussed in Chapter 3. They are probably genetically specified, and indeed shared with the higher animals, but they represent a grammar of perception and thought, not of language. They are reflected in the various grammars of human languages, but with a great deal of added complication that is *not* genetically specified.

The extra complication is unavoidable because verbal language is tied to a one-dimensional sequence of words, while the structuring of the scenes, otherwise the predications, to which they have to refer is established synchronically (though over a single step in time) in a multi-dimensional space. Consequently, as I suggested in Chapter 3, the words have to include not only the substantive elements that are to be fitted together, as if in a three-dimensional jigsaw puzzle, to build up the whole which a sentence is to convey, but also a number of link elements (conveyed by inflexions, prepositions, conjunctions, features of word order, and so on) whose only function is to indicate which substantive element in the series fits on to which, and in what manner.

These ideas are, I believe, compatible with Edelman's general position and complementary to it. The burden of his own criticism of Chomsky's theory of generative grammar is that 'it assumes that syntax is independent of semantics and that the language faculty is independent of external cognitive capabilities . . . . It also ignores the fact that language is used to convey the thoughts and feelings of individuals who already think independently of language' (*BB*, 243). He gives an interesting account of G. Lakoff's theory of 'cognitive grammar', according to which language is characterized by symbolic models which 'pair linguistic information with the cognitive models that themselves make up a *preexisting* conceptual system'. Lakoff understands categories in terms of 'container schemas' (reminiscent of my 'container forms') and structural relationships in terms of other 'schemas' of a spatio-temporal kind. 'Meaning derives from embodiment and function, understanding arises when concepts are meaningful in this sense, and truth is considered to arise when the understanding of a statement fits one's understanding of a situation closely enough for one's own purposes' (*BB*, 250). Edelman sees Lakoff's cognitive grammar as complementary to his own theory. It differs radically, as he says, in

philosophy, style and methodology from the generative grammars that he finds unacceptable. For my part, Lakoff's ideas about language, which I have not studied in detail, seem on the face of it to be closely related in their general nature to my own, although they are no doubt expressed in very different terms. It is not clear to me just how far they have been developed.[5]

INTENTIONALITY AND MEANING

Edelman emphasizes that conscious experience is always intentional, 'always in reference to an object'. Meaning takes shape in terms of concepts (and therefore categorizations) which are linked to value and the concept of self (*BB*, 170). It arises from the interaction of the value-category memory with the combined activity of conceptual areas and speech areas (*BB*, 130). Edelman would, I think, accept the linking of meaning with function which he ascribes to Lakoff; but his own formulations are a little indefinite (except negatively when he is condemning the views of cognitive scientists). I believe he is wrong – and in conflict with his own arguments about the nature of concepts – when he suggests that the speech areas are necessarily involved. My hope is that he would in fact agree that fundamentally the meaning of any concept or thing is its use, or potential use, in relation to some purpose. Without intentionality, no meaning.

THINKING

When it comes to thought, Edelman offers a few scattered ideas (*BB*, 173–5) but no definitions and no general theory. He does not accept that thought can be identified with consciousness, since on his analysis it has additional acquired components: a complex of images, intentions, guesses and logical reasoning. It is a mixture of several levels of mental activity. Apart from certain spatial, tonal and rhythmic activities, higher thought depends on language, logic and an inner dialogue with an 'interlocutor'. It is driven by Jamesian processes [intentionality? personality?], is susceptible to great variations in attention and in general is fuelled by metaphor and metonymy.

This is for me a disappointing section of the book. It is my impression that Edelman has not thought through his distinction between thinking and consciousness; and that, if he did so, he would conclude that in his terms thinking is the process by which higher-order consciousness is structured; it is a complex process, but it does not involve adding new components to a scene or predication already somehow complete without them. Consciousness, I would suggest, *includes* thinking. Having arrived at the important concepts of primary and higher-order consciousness and of the scene, he offers no deeper analysis of how they relate to each other and to the process of thinking. He does not go more deeply into such questions as: On what principles is the scene integrated? If through spatio-temporal relationships, how does the metric space of a perceptual scene relate to the presumably topological space of the brain map? How, further, does it relate to 'the time chunk which I call the present'? He remarks with real insight that 'thinking occurs in terms of *synthesized* patterns, not logic, and for this reason it may always exceed in its reach syntactical, or mechanical, relationships' (*BB*, 152); but he does not develop this idea, which could have brought him close to the Polanyian distinction between formalized and unformalized knowing. He does not give the account of how logic would be expressed in his model. I think he overstates the role of inner dialogue, on which I believe Vygotsky is a good guide.[6] I am sure he is right to lay emphasis on the importance of metaphor and metonymy, which reflect the mind's basic mechanisms of association through resemblance and contiguity; but he fails to provide the supporting analysis which might be expected of the ways in which we recognize resemblance and generalization.

Edelman, however, has made it clear that his basic concern is with the biological bases of mind, and on these he offers a remarkable wealth of information and insight. It is hardly reasonable to expect him to cover everything else in the same depth.

OBJECTIVISM

One theme that runs through Edelman's book is his rejection of the whole approach of cognitive science as he construes it. He argues that, while 'connectionist' or 'neural network' systems allow for alterations as a result of experience, the mechanism of this learning is

instructional, not selectional; it is based on following algorithms. The idea of instruction in this sense requires someone, or something, to be in a position to read the instruction; but this means that there has to be someone else to read the result; and this leads on to the impasse of an endless regression of information processors in the head. In systems of this kind knowledge is expressed in symbolic representations, which acquire meaning because they correspond exactly with real entities or categories in the world, to which they are more or less arbitrarily assigned. The real entities can be defined in terms of 'classical categories', that is, by means of criteria which are singly necessary and jointly sufficient. Psychological processes manipulate the symbols in accordance with a set of rules known as a syntax (*BB*, 228).

Edelman challenges the 'objectivism' of this approach in terms which would have given pleasure to Polanyi. Scientific realism, he says, is based on three assumptions: (i) a real world (including humans but not depending on them); (ii) a linkage between concepts and that world; and (iii) a stable knowledge that is gained through that link. But objectivism assumes, in addition, that the world has a definite structure made of entities, properties and their interrelationships, which are capable of definition according to 'classical' criteria; and that logical relations between things in the world exist objectively; in consequence symbolic mental representations of the world are either true or false in so far as they mirror reality correctly or incorrectly (*BB*, 230–2). Against this Edelman appeals to Wittgenstein's concept of family resemblance and to work by Rosch which shows that categories like 'red' have fuzzy boundaries but none the less contain central members. The brain is historical and value driven. It forms categories by internal criteria and by constraints operating on many scales, not by means of a syntactically constructed program. The world with which it interacts is not made up of unequivocally definable entities. He concludes roundly:

> The mind is not a mirror of nature. Thought is not the manipulation of abstract symbols, whose semantics are justified by unambiguous reference to things in the world. Classical categories do not serve in most cases of conceptual categorization, and they do not satisfactorily account for the actual assignment of categories by human beings. There is no unambiguous mapping between the world and our categorization of it. Objectivism fails. (*BB*, 237)

> The world with its "objects" is an unlabelled place; the number of ways in which macroscopic boundaries in an animal's environment can be partitioned by that animal is very large, if not infinite. Any assignment of boundaries made by an animal is relative not absolute and depends on its adaptive or intended needs. (*BB*, 28)

A corollary is that species are not 'natural kinds'; their definition is relative, they are not homogeneous. Population thinking, as Edelman puts it, deals a death blow to typological thinking or essentialism of a Platonic kind.

I cannot judge how many cognitive scientists would accept Edelman's representation of their views. Some of them, I think, try to distance themselves from radical objectivism, though Dennett's position certainly would seem to be open to his blast. Much more important, however, are the positive implications of what he is saying. His heavily qualified version of realism seems to be a strong and convincing position to hold. Edelman's views here are close to those of Rom Harré which I shall be considering in the final chapter of this book.

8

Reflections on Edelman

TOP-DOWN AND BOTTOM-UP

Both Dennett and Edelman are engaged in constructing models of the mind from the bottom up; but Edelman's has the great advantage of being built directly in terms of the anatomy and processes of the brain, while Dennett's is essentially a speculative model built in terms of the computer analogy. Their views are by no means always in conflict. Dennett's account of a pandemonium of competing multiple drafts (which may itself perhaps owe something to recent developments in neuroscience) can be compared with the picture of 'topobiological competition' between neurons and neuronal groups drawn by Edelman. But at this level Edelman's account is far more detailed and convincing. It gives a central place to the morphology and topology of brain development and to the different kinds of maps which emerge from them – an aspect of what happens in the brain that has no counterpart in Dennett's model, apart from a brief reference to the representation of space by a 'bit-map' (a term which he leaves unexplained). Dennett's account includes many insights of value, particularly perhaps with regard to narratives; but I would wish to fit them, with whatever adjustments may be necessary, into the framework of Edelman's model, rather than vice versa.

In the first three chapters of this book I have outlined my own model of the grammar of consciousness, elaborated within the framework of Polanyi's theory of tacit knowing. This, as I have already stressed, is a top-down model, based on the analysis of what goes on in consciousness. It rests inevitably to a large extent on introspective evidence, though, as Edelman remarks in relation to qualia, such evidence can often be correlated with observable phenomena as well as with everybody else's introspective experience. My own chief concern in the present enquiry is to explore the possibility of bringing together a top-down model and a bottom-up model in such a way that they form a coherent whole; and this

is an enterprise in which Edelman himself shows a good deal of interest, as for example in his discussion of Lakoff's theory of cognitive grammar. At one point Edelman refers to his theory of consciousness as one 'that takes as its canonical reference our own phenomenal experience as humans and our ability to report that experience by language' (*BB*, 225). In contrast to this Dennett treats phenomenal experience as a curiously dispensable fiction or figment, a view which enables him to simplify his mechanistic model of the mind, but at the price, in my judgment, of evading altogether the central problems of consciousness and reality. He is closer to epiphenomenalism, the mind as a functionless shadow accompanying the body, than he likes to admit.

Not that Edelman can solve the mystery of consciousness. Who can? But he is much more vividly aware of its dimensions and of the possible limitations of the human intellect in dealing with it. After a certain point, he says, the mind lies beyond scientific reach – in effect because of the circularity of consciousness investigating consciousness. However we are a long way yet from reaching the limit, if limit there be. Progress and a certain consolidation could be achieved by relating the Edelman model to a model of the sort I am advocating. The weakness of the latter is that, although not incompatible with what is known of the brain, it is not firmly rooted in brain science and therefore represents a speculative rather than a scientific psychology. Its strength is that it can offer a far more comprehensive and coherent account of the structure, processes and functioning of the mind as the regulator of the whole life of the organism than so far any bottom-up theory can afford. We need, I think, to bring the two closer; and in the rest of this chapter I shall examine some of the problems involved.

RECOGNITION

Edelman maintains that brains are selective recognition systems and that neurobiology is a science of recognition (*BB*, 79). He explains how such systems work by first generating a population of variants and then picking out individuals from them by a process of selectively matching or fitting them to the situation in which they find themselves. Evolution working over millions of years is one example, the immune system working over a very brief

timescale is another. The brain, from its foetal beginnings, is built up through a somatic selection system, as particular developments and connexions are established epigenetically and *ad hoc* within the broader constraints of determination by the genes. And the working of the brain is based on the key processes of categorization (itself a kind of recognition) and of correlation, which, as I would interpret it, represents on every occasion the establishment of a new category to which the two patterns correlated both belong.

Matching and fitting are metaphors derived from the juxtaposition of shapes. Edelman himself emphasizes that the functioning of the brain cannot be separated from its anatomy. It is 'dynamic morphology all the way down'. The function of every protein depends on its shape. The working of the brain is based on the creation and correlation of maps, which are two dimensional shapes or forms. The strengthening and weakening of synaptic connexions in and between the primary repertoire of neuronal groups causes (without much further anatomical change) a secondary repertoire of circuits to come into existence; and the development of point-by-point correlations between such circuits and the two dimensional sensory receptor sheets of the body leads, through a further process of selection and fitting, to the creation of brain maps.

These maps, if I understand Edelman correctly, must themselves also function as electrical circuits. In the course of his argument against the use of models based on the digital computer Edelman remarks that 'the sensory signals available to the nervous system are truly analogue in nature and therefore are neither unambiguous nor finite in number' (*BB*, 225). As I understand it, the word analogue in this context means continuously varying; and that in turn means that it refers to a *form* – in this case the wave form of a current of continuously varying frequency. Edelman does not tell us much about the transmission of signals in the brain, but I derive the following from *The Conscious Brain* by Steven Rose:

> The nervous system operates in terms both of a position code (which axon is firing, from which cell, and connected to which, determines the interpretation of the information, for instance, between sensory modalities) and in terms of a frequency code (how frequently the axon is firing now in relationship to the rate of firing of its neighbours now and to its own frequency a short time interval ago). Relatively simple neuronal circuitry can provide at least model mechanisms for a variety of brain func-

tions, from the simple reflex through to the reception and analysis of visual information.[1]

The essence of a form is that it is a continuous whole. It is one undivided thing recognized in one space. (It will be remembered that in my terms the space may have what I have called an extracted or synchronic time dimension – as when one recognizes a tune or a wave form, or for that matter a historical episode like the Norman conquest, as a single whole in what Edelman calls the 'remembered present'.) Yet, as I have argued in Chapter 2, this same undivided thing can also be represented at the level below it by a finite set of digital values in separate dimensions, as the shape of a graph can be represented by its coordinates. There is a hierarchical *correlation* between the two representations, yet they can never be absolutely equated with each other.

THE PROCESS OF MATCHING (1)

Against this background let us look again at the process of matching or fitting. I have described this elsewhere as the cap-fitting relationship, one by which a particular form is accommodated to a more general form and thereby classified – in the way that one particular human head could be classified as belonging to the general class of heads fitting a size 7 cap. A class consists of those particular instances that on generalization coincide with a particular form adopted as the defining paradigm of the class. They fall within the paradigm, they lock into it, they fit. These are all spatial metaphors, but we find no difficulty in using them in abstract contexts. On the contrary, as I would argue, we cannot avoid using some sort of spatial metaphor, since thought itself is conducted in a flexible, metaphorical, non-perceptual space.

The match can be close or merely approximate – as with the fit of a suit. The simpler the paradigm form, the more general it is, and so, in many circumstances, the greater the number of possible instances. If it is recognized in a Euclidean space which, unlike a metric space, allows for symmetrical expansion or contraction, the comparative size of the objects does not affect their matching. On the other hand if the form is sufficiently complex, then its range of application is so reduced that in some contexts only one instance – or none – can be

identified. At the digital level (the level of the tailor's measurements rather than of the suit), the smaller the number of identifying coordinates, the more general the form; but it is significant that each coordinate marks a limit – anything within it matches, anything beyond it does not. (A measurement can mark a limit in both directions.) A collection of such limits is a boundary, and a boundary is a form.

It is my argument that ultimately it is the form which validates, and indeed identifies, the measurements or coordinates, not vice versa; just as for Polanyi, although there can be a dialectic alternation between intuition and computation, ultimately it is the intuition which validates the computation and so gives it meaning, not vice versa (*PK*, 131). I am sure that Edelman is right in his suggestion that finally we have to take phenomenal experience as the canonical reference for our theories; and phenomenal experience is of forms – in relationship to other forms and infused with qualities and intensities – not of one-dimensional coordinates or measurements.

THE PROCESS OF MATCHING (2)

How can this theory of matching and fitting be said to apply to abstract thinking as well as to perceptual experience? I have already given arguments in Chapter 2 to suggest that we think in terms of conceptual forms. In Chapter 3, in the section headed 'Relationships between Ideas', I have argued that we build ideas together into greater wholes with the aid of logical as well as spatio-temporal relationships, but that even the logical relationships of classification and reclassification are understood in terms of spatio-temporal metaphors. The logical relationships themselves are only possible because we think in a flexible quasi-topological space in which we can move images about and so match them with actual perceptions or with other images.

But then, how can these ideas be related to Edelman's account of the working of the brain? Consider this description of the process of categorization:

> To explain how categorization might occur, we can use the workings of what I have called a "classification couple" in the brain. This is a minimal unit consisting of two functionally different maps made up of neuronal groups and connected by reentry. Each map *independently* receives signals from other brain maps or from

> the world.... Within a certain time period, reentrant signaling strongly connects certain active combinations of neuronal groups in one map to different combinations in the other map. This occurs through the strengthening and the weakening of synapses within groups in each map and also at their connections with reentrant fibers. In this way, the functions and activities in one map are connected and correlated with those in another map. This occurs even though each map is receiving independent signals from the world: one set of inputs could be, for example, from vision and the other from touch. If the maps are topographically connected, they correlate happenings at one spatial location in the world without a higher-order supervisor.... The interactions of *multiple* maps can be correlated in the same fashion. (*BB*, 87)

As I see it, the changing threshold values of synapses and reentrant connexions represent variables in each system. The result of the process of correlation is that the two maps remain different – they are still receiving independent signals from the world – but a certain number of variables are adjusted between them in such a way that their values correspond. Not all the variables in each system are involved (the suit does not match my body at every point), but only those which have been picked out for the purpose by what must be in some sense a process of superposition. The variables forming a map must involve relationships such as those of neighbourhood, succession and inclusion or exclusion; but they may also include relationships of quantity, such as distance or angle, or of quality, such as colour. The more of these are included the more precise the correlation. My layman's understanding is that if distances are specified, the geometry of the map becomes affine, and if angles are specified it becomes Euclidean: otherwise it remains topological. If quantities are involved, I assume that they do not have to be identical in each map, but that the *relativities* between all quantities specified must be precisely preserved. I further assume that the affine or Euclidean geometries are not necessarily physically reflected in brain maps, so long as the quantities concerned are specified digitally in some manner.

The effect of such a process of correlation is to create a third map, more generalized than either of the other two, but one which establishes the paradigm of a class, of which both are instances. Correlation, therefore, as I understand it, is a categorization in which the two maps are equated as members of a new category. In a simple

categorization, as distinct from a correlation, the more general of the two maps is taken as the paradigm, defining a class, while the other, more particular map is matched to it as an instance of the class.

If the maps are defined in terms of a specific number of variables and the values they exhibit, am I not equating my understanding of categorization with what Edelman calls 'classical categories', defined by criteria which are individually necessary and jointly sufficient? I think not. Although the maps may be defined at one level in this fundamentally digital fashion, at the higher level the maps are themselves forms, and their 'output' would appear to be in the shape of a wave form. It may be theoretically possible, by some kind of analysis, to derive from the whole form the constituent values that notionally make it up; but it is the whole that carries meaning, not the constituent values which, as Polanyi saw, acquire their meaning only in their relation to the whole. Often we recognize the whole before we can identify its constituent values; and often we are not ever in a position in practice to identify these values, or at any rate all of them. We are back with Polanyi's distinction between the articulation and the conception, the text and the meaning which was discussed in Chapter 1. And it will be recalled that in Polanyi's view (*PK*, 87), while sometimes the articulation and the conception are coextensive, in other cases the conception is beyond precise articulation, and in other cases still the articulation can outrun our capacity to grasp its meaning. It could be suggested that, even when we cannot identify the component values, they must still be there, completely specifying the whole which they serve; but this would involve reductionist assumptions at odds with Edelman's view (and mine) that it is phenomenal experience which we should take as the canonical reference for our theories.

Apart from this there is a further argument which can be brought to bear on the issue of classical categories, namely the argument, to which Edelman refers, concerning family resemblances. But before we can consider this, we need first to turn to the mechanisms of memory.

MEMORY

For Edelman memory is closely involved with categorization, it is a revisiting of a previously established category, which is modified in

the new circumstances. Memory, he insists, is a system property, not a replica or trace; it depends on the structure of the system; it 'emerges as a population property from continual dynamic changes in the synaptic populations within global mappings' (*BB*, 102). In other words it is the meaning of the whole, a categorization which in some sense retains its identity even when its constituents change: 'at different times the elements contributing to that response are different, and in general they are likely to have been altered by ongoing behaviour' (*BB*, 102). How can this be? It seems to me that any such identity must be rooted in a particular location in the cortex – if not a fixed location, at least one that is stable in relation to other comparable features. Without that how can it be said to have an identity? If we say that it depends on the structure of the system only – presumably its higher-level, more generalized structure, or the relativities between the values of its principal variables rather than the values themselves – then it becomes impossible to avoid the classical categories and the essentialism which Edelman rightly rejects for the great majority of categorizations.

If it is accepted that location is involved, the way is clear for a model very close to my model of the mind-manifold, as described in the section 'Stored Ideas' of Chapter 2:

> ... an immense terrain shaped by the impact of the experience of a lifetime. Its identifiable main features, the idea complexes, are themselves agglomerations of lesser features brought together either by contiguity in space-time or by the unifying power of generalizing classifications. It is thus ordered in two ways; as an immense, flexible map extended in space and time, the world and history, on which anything or event can be located in relation to any other, or to Me-Here-Now; and as a repertoire of general ideas identified by markers drawn from all the signs, codes and languages with which the individual is familiar. Forms derived from our conscious experience float down, as it were, to the reefs of memory below, settling as accretions where they find affinity through space-time location or through similarities, and modifying as they do so the accumulated fixations that build up the features of the manifold.

An idea complex, on this model, could in theory be built strictly on the basis of similarity, conforming therefore with the definition of a classical category: an example might be the idea of a triangle,

which can be recalled in many different contexts, but is firmly defined by structural, system properties. But much more often an idea complex is built up through a concatenation of forms, each linked by family resemblance to at least one other, but with no single canonical form with which, on generalization, every instance must coincide. This is why I call it an idea complex rather than an idea. Such families at their extremes can stretch very far apart. Consider the idea of running, which begins from a particular form of reciprocal motion by a pair or plurality of legs. We apply this to a piston engine, with its reciprocating cranks and pistons. But we also transfer it quite happily to a turbine engine with a quite different motion; and also to the running of a school or a government or what not else. The links of family resemblance are in fact the links of metaphor or metonymy, on the importance of which Edelman lays so much emphasis. Even the idea of a triangle has its fringe associations which contribute to the complex – the associations which go with the 'Bermuda Triangle', for instance, or with the triangle as a musical instrument.

In sum my impression is that what I call an idea complex corresponds fairly closely to what Edelman calls a global mapping, or perhaps to a mapping which recombines activities occurring in different global mappings (*BB*, 109). According to my theory a conceptual form, with or without an imagined perceptual form, is evoked by a kind of resonance from a particular idea complex in a particular situation. It does not bring in the whole idea complex – which in most cases would be far too extensive and self-contradictory for that to be possible – but it takes shape as something more limited, yet derived from it. The resonance that evokes it works through resemblances, relying either on metaphor (a broad resemblance of the whole) or on metonymy (a resemblance in the part bringing the rest of the whole with it). The basis for this resonance appears to be provided by the very complex interconnectedness, which Edelman describes of cells, neuronal groups, maps and mappings in the cortex, together with their further connexions with other parts of the brain.

One implication of this model is that the same form, or categorization, can have a contributory presence in many different parts of the brain. Another implication is that there are few, if any, precise boundaries between different features of the continuous 'terrain' of the mind-manifold. Which features are picked out as idea complexes on the map of the world and history depends on

what the situation, or 'scene', presents at the centre of conscious attention, and the focus or perspective within which it is generated. As I stand looking at a mountain *massif*, it depends upon the perceptual and conceptual context and the resonance it evokes, whether I focus on the outline of one mountain or on three separate peaks, or on a single rock, or on a part of France, or on something else. Whichever it is, the form that I perceive or imagine is always taken as *representing* something much greater – the idea complex, including conceptual as well as perceptual elements, which lies behind what I see. (The connexion with the principle of metonymy is to be noted.) If I move to a different spot a few miles away and look again at the *massif*, what I see will be different, but what it stands for will still be the same.

It is much the same with idea complexes identified by signs and symbols such as words. Every time we encounter a word, the idea complex associated with it is potentially modified by the new association. This does not mean that every situation ever related to that word throughout a person's lifetime is recorded in memory; as Edelman stresses, memory is not a replica or trace. But the idea complex spreads out in many directions as experience accumulates, and often stretches to include ideas specifically located on the space-time map. By no means the whole of it is activated on individual occasions when we use the word. Yet each time it is the same word, the same physical sign or symbol, that we use; and it still marks, locates and stands for the complex as a whole. The process is like what happens (according to Schrödinger) when you strike a bell: 'There is, of course, an infinite variety of ways of striking a given body, say a bell... . This produces an infinite variety of shapes of the ensuing vibration... . But in every case, however complicated the actual motion is, it can be analysed as being a superposition of a discrete series of comparatively simple "proper vibrations"'.[2] The finite number of variables in every mapping, or the finite terms of the dictionary definition of a word, could be compared with these proper vibrations. As with the proper vibrations, however, when relativities between them are introduced, the variety possible is infinite. What is more, the boundaries between idea complexes located by words or other symbols are just as variable, depending on the context and the focus of attention, as those between features on the mind's map of the world in space and time. The same association can be shared by many words and can be evoked by any one of them.

An idea complex can yield in some circumstances a quite narrowly defined form, and in others a much more generalized form; as we have already noted, this capacity to move up and down an axis of generalization, as it were, provides the basis for the mind's power of classification and is thus of enormous importance. But how is it that when an idea complex is stimulated by some resonance with the immediate situation, the whole complex is not immediately activated? My guess – and it can only be a guess – is that initially certain elements of the complex are stimulated by particular features of the immediate conscious scene; these stimulate others until together they establish some kind of circuit, which can be of a narrowly particularized or a widely generalized kind (and in any case is more or less unique to the occasion); but the stimulation does not go further because threshold resistance increases as remoter elements are reached. At the same time I have the impression that there is some wider simultaneous reverberation through the whole complex, or a large part of it, which is not articulated in any way but helps to establish the quality and intensity of our apprehension of the form in question.

THE SCENE

How then are the outputs of various categorizations and mappings brought together into consciousness in the spatio-temporal ordering which Edelman calls a scene? This is a crucial point, for it is here, in Edelman's view, that consciousness comes into existence (and I agree with him). This is his account of the matter:

> Learning certainly occurs in animals that show no evidence of conscious behaviour. But in some animal species with cortical systems, the categorizations of separate, causally unconnected parts of the world can be correlated and bound into a *scene*. By a scene I mean a spatiotemporally ordered set of categorizations of familiar and nonfamiliar events, *some with and some without necessary physical or causal connections to others in the same scene.* The advantage ... is that events that may have had significance to an animal's past learning can be related to new events.... Even more importantly, this relationship can be established in terms of demands of the value systems of the individual animal. By these

> means the salience of an event is determined not only by its position and energy in the physical world but also by the relative value it has been accorded in the past history of the animal as a result of learning. It is the evolutionary development of the ability to create a scene that led to the emergence of primary consciousness. (*BB*, 118)

This explains, as it seems to me, the nature of a scene and its evolutionary advantages. But Edelman does not go into any detail about *how* categorizations are correlated and bound into a scene, nor about where and how in the brain the process takes place. He mentions that primary consciousness is limited to a small memorial interval around the time chunk of the present, but he does not suggest by what mechanisms the volume of space-time in which the scene takes place is established and represented, and the scene itself is built up. He does not say much about the nature of consciousness itself except that it is a process – which is, I think, a dubious categorization. I say these things not in criticism, but as an indication that brain research has still a long way to go. Edelman himself stresses how little it is that we actually know. He points out that higher-order consciousness is not limited to the present, it can model 'the past, present, future, a self, a world'. But he does not discuss the way in which it is constrained and focussed within the limits of a scene (or as I would call it, a predication) which is still structured in terms of spatio-temporal images and metaphors and still encapsulated within a little chunk of real time moving ineluctably onwards.

I cannot of course add anything in terms of neuroscience to what Edelman has said. And there are still very great limitations to what can even be suggested in terms of a speculative model. But there are striking correlations between what Edelman describes as a scene, and what has been described here as a predication. Within the Polanyian framework of the theory of tacit knowing discussed in Chapter 1 of this book, I have set forth in outline in Chapters 2 and 3 a theory of conceptual forms and of tacit integration as a grammatical process, which can be correlated encouragingly well, as it seems to me, with Edelman's theory of neuronal group selection. Speculatively my theory stretches a long way beyond what Edelman has proposed; and although such speculations do not constitute science, they can have considerable suggestive value.

There are two further points concerning the scene, on which some comment may be relevant. The first is in the nature of a re-

minder. The categorizations which build up a scene correspond, in my model, to the forms fitted together in various ways to constitute the form-as-a-whole which is the meaning of the predication. This form-as-a-whole is built up in a space, but also recognized over a transition in time, as the subject is related to the predicate to create a greater whole, which is the subject elaborated. The *structure* of the scene is created by a set of relationships recognized between these forms – relationships which are basically spatio-temporal and grammatical, but can also include logical relationships of classification and reclassification. I relate the two levels of the component forms and the form-as-a-whole to what Polanyi calls subsidiary particulars and the 'comprehensive entity', which is focally known. But the construction of the scene or predication also involves a third level which must not be ignored, that of the qualities and intensities which infuse the component forms and can often (as when sustaining pedal is held down on a piano) infuse the form-as-a-whole through their collective harmony or dissonance. I suggest that every part of the brain that is activated at a given moment of consciousness contributes to these qualities and intensities – not merely those involved in particular categorizations which emerge individually or plurally into consciousness as forms

My second point concerns the nature of consciousness. I make no claim to explain consciousness; my concern is rather to emphasize the depth of the mystery which lies at the centre of all human existence and understanding. I have already quoted in my discussion of Daniel Dennett Kant's deceptively simple remark that 'the Ego is but the consciousness of my thought'. This remark can also be taken in reverse: could we not say that 'Consciousness is only my self thinking'? Yet neither statement gets us very far, and it is not easy to improve upon them. Consciousness is not a thing, it is not a process, it is not a concept; moreover, as Edelman recognizes, it is not to be equated with *self*-consciousness. I have argued that a scene can only be synthesized from a point of view, that of Kant's 'featureless I', the transcendental subject of thought, which identifies Me-Here-Now; but this viewpoint self is always distanced from the scene, not part of it, so we cannot ever be directly conscious of it . For actual self-consciousness we have to identify an objective idea of the self, an instance of a categorization, which can form part of the grammatical structure of the scene or predication.

Consciousness, as this implies, is linked to a self located in time and space, and also to the construction of a scene or predication:

without a *completed* predication there is no consciousness. All that we know of the world, including the brain, is derived from moments of consciousness, and things that we have learned can only be recalled and grasped again in moments of consciousness. Certainly consciousness is linked to certain types of activity in the brain; but this offers no explanation of what it is, since we have no independent knowledge of what brain activities are; we can only think of them in terms of categories, including space and time, which are derived from consciousness itself.

It is evident that we have arrived at the perennial problem of mind and body. I have no answer to that problem. I am quite unconvinced by any reductionist solution which says that the mind *is* the brain or vice versa; but neither can I make any sense of dualist solutions. I suspect that the question we appear to be asking is misconceived. The most sensible attitude we can take to this problem at present may simply be one of alert agnosticism.

TELEONOMIC SYSTEMS

Edelman argues that the brain works by recognition and selection, not by instruction – in other words, not by the application of algorithms or rules. A rule is a constraint upon what happens, upon possibilities of transition from one state of a system to another. The laws of nature are such constraints. Where a combination of laws or rules applies in a situation, the possibilities of transition may be reduced to one only, or even to zero; but in many situations a range of possibilities appears to be available, and what actually happens can then be regarded as the result of an act of *selection*, whether by fate, chance, will or in some other way.

It has been much debated whether the world is entirely deterministic, whether in the last analysis everything that happens does so because the constraints of natural law permit no other outcome. In the present context it is not necessary for us to enter that debate; but it may be relevant to point out that, even if the world is deterministic, the actuality of what happens – for example when a stone rolls down a mountainside – is different in itself from any combination of laws which the occurrence may reflect. Selection, as distinct from any kind of rule, is the emergence of actuality, reality, history, in time. It refers to a particular event, while a rule refers to a

general class of events. It involves a single direction for time, whereas the laws of nature are, I understand, reversible in time. As Edelman says,

> Science ... attempts to describe ... the boundaries of the world – its constraints and its physical laws. But these laws cannot replace history or the actual courses of individual lives.
>
> Science ... will not be able to describe individual or historical experience adequately. But it does provide a satisfactory (and indeed the best) description of the *constraints* on experience. (*BB*, 162, 163)

Recognition, as distinct from selection, is a cap-fitting process. It is the matching of two forms. But if it were only that, it would be *no more* than an event, like the stone rolling down the mountain. Let us consider as simple a case as possible – say a primitive animal with one organ for what Edelman calls the sensory sampling of the environment, which can register two conditions: light and no light. This registration is still in itself no more than an event, a consequence according to law (given the organism's structure) of the presence or absence of light. But let us say that the animal also has two possible responses to this registration, swim and not swim, and that it responds positively when it registers light and negatively when it does not. This is a *selective response*, a decision; for every selection is a decision and every decision a selection. Already we are concerned with recognition, information, decision, behaviour and also, by implication, purpose. This is the biological world. As Edelman says, physics proper does not deal with recognition systems, which are by their nature biological and historical. Recognition implies meaning. And meaning is use or function in relation to achieving a purpose.

Biological systems are open, self-regulating systems; and a self-regulating system has an inbuilt purpose, namely to survive. To survive as what? The answer is, as a *continuing system* (a system is defined as a set of units with relationships among them). What has to be avoided is disintegration, otherwise death. There can be changes over time in the state of the system, and there can also be progressive changes in membership and constitution which transform the system entirely, as when for example the zygote cell is

progressively transformed into the adult animal. The impulse to maintain the system and avoid disintegration can express itself not only at the level of the system itself, but also at that of subsystems such as organs and cells, or even genes.

This is not to deny that the growth and behaviour of animals is generally, if not entirely, deterministic. But the determinism arises from a gene pattern which is incorporated in the individual, and may be unique to it. And something more is also implied, even in the crudest act of recognition, namely some kind of abstraction from time. Existence is not just 'one damn thing after another'; there are connexions of resemblance between things. And the recognition of resemblance already implies meaning or purpose. Without that the locking of one molecule into another is merely a unique event, totally disconnected and meaningless, like all things and events once resemblance is excluded. This is not to say that the animal has any consciousness of purpose, but it *is* to say that there is some sort of purpose, or at least direction, to evolution; it is a road leading somewhere, even though we cannot say where. For without that the word evolution is meaningless. Edelman is right to begin here. 'No amount of neuroscientific data alone can explain thinking', he says (and he could have referred more generally to recognition or response); 'only an additional evolutionary account involving historical events and natural selection' can provide an explanation (*BB*. 174–5). At another point he says: 'Given the facts of development and evolution, we deny teleology... . But at the same time we admit that evolution can select animals in such a way that they have general goals, purposes and values, so that they embody what we call teleonomic systems' (*BB*, 161). But this is in fact to admit that evolution is itself a teleonomic system, one which embodies the purpose of survival; and there is not much left then of the denial of teleology. Biology involves the possible or potential as well as the actual.

INFORMATION AND REGULATION

Once a system includes a subsystem capable of assuming a number of different possible states without disintegration, it is capable of being *informed* (rather than *deformed*). But an element drawn from this information repertoire has no meaning – and cannot therefore

be truly counted as information – unless it can be linked to a response from another subsystem which is correspondingly capable of various possible responses without disintegration. The response is either of growth (which includes healing) or of behaviour. If the link between information and response is random, we cannot sensibly speak of information being passed or of selection being made; but if it has a detectable purpose, then we can. If the link is itself hard-wired by the gene pattern, the process is a matter of instruction rather than selection or thinking, a neural function but hardly a brain function. But a true brain function is different. The brain, as Edelman describes it, has, first, to hold together a variety of incoming recognitions; secondly to apply priorities to them (i.e. 'value' identified in relation to Ashby's 'essential variables')'; and thirdly to produce a coordinated response. Decisions are based in such a system, as he says, not in accordance with an external program, but on the basis of 'statistics of signal correlations', and thus within the system itself.

An organism capable of learning may retain a number of machine-like, hard-wired responses; but over a wide spectrum there is no direct linkage between information and behaviour. Instead there is an indirect linkage growing out of past experience; and this means that immediately we have to postulate ways of recording the effect of past experience, identifying goals, organizing appropriate patterns of behaviour directed towards these goals, applying priorities between goals and between different possible plans of action, taking decisions, putting them into effect, and adjusting the record retrospectively. The amount of information that can be absorbed is immensely increased, the repertoire becoming an open-ended store. Correspondingly the range of possible combinations of information and coordinated plans of action is immensely increased, and indeed also becomes open-ended. As Ashby pointed out, the inherited regulative capacity of such an animal, derived from the gene pattern, is vastly amplified by the addition of variety in immense quantity derived from the environment through the experience of the animal's lifetime.

The more vast the capacity of the brain, the more complex is the task of exploration, selection and ordering required to put together successive coherent diagnoses of the successive situations with which an individual is confronted in life, and to produce rationally coordinated responses. The acquisition and use of language is a factor here of incalculable importance in increasing and develop-

ing the brain's capacity to categorize and so to respond effectively to its environment. In the higher animals, and pre-eminently in man, this ordered response is achieved through the successive scenes or predications of consciousness. I have suggested that these are built up through a constantly shifting cloud of associative resonance across the mind-manifold, and framed within multiple purposive cycles. These purposive cycles are themselves established by the shifting gradients and thresholds of the manifold, which create basins, as it were, towards which, as goal or aversion images, our thoughts tend to gravitate. The more the response can as a result be said to be determined by the experience of the individual in a comprehensive and coherently ordered way rather than by inherited compulsions or by the incoherent pressures of fragmented experience, the more it can be said to be *self*-determined. And how are we to understand freedom if not as self-determination?

THE ARENA OF CONSCIOUSNESS

The process of making coherent sense of incoming information and planning a coordinated response depends on two things: the *ordering* of incoming information; and the *correlation* of incoming experience with past experience. Both of these depend upon the establishment of a scene in space-time, or some metaphorical space-time; and the recognition of such a scene appears necessarily to involve consciousness – if only because the volume of space-time has to be synthesized from a point Here-Now which is related to the life trajectory of the animal concerned, and consequently represents Me-Here-Now.

It is the creation of this volume of space-time which provides what I have called the arena of consciousness, and so make possible the establishment of an ordered scene. But our consciousness is not restricted to the immediate perceptual arena; we project a version of space and time beyond the arena to create what might be called the excogitated world of thoughts about the universe and history, the past and the predicted future – and also in appropriate circumstances, as I have argued, the imagined world of fictional stories, and the abstracted world of logical relationships. The process of correlation, as Edelman's model shows, prototypically involves a superimposition of the scene in its spatio-temporal focus upon cate-

gorizations drawn from the excogitated world. These connect it in some sense with past and future and so make possible the *causal* as well as the spatio-temporal ordering of what happens.

Such correlation with categorizations, as Edelman has seen, is necessary if the scene – and hence primary consciousness – is to come into existence at all; but it is only with the emergence of higher-order consciousness that instances of such categorizations, or combinations of them, can emerge as the subjects of focal awareness themselves, instead of merely contributing as subsidiary forms or qualities. The categorizations establish a limited range of possibility resolved into reality by the actual event, which is an event of *selection*; and it is for this reason that when we become consciously aware of any event Here Now, it can be said that information has been passed, or, in less familiar terms, that creation has taken place.

Selection is always a matter of survival, even if it is only the survival of one theory and the extinction of another. The counterpart of survival is death, and in a certain sense it is true to say that the instrument of selection, and thus of life, is always death. Clearly there is a distinction between the death of an organism in a particular situation and the rejection of an alternative by the conscious (or unconscious) mind on a particular occasion. It is partly the capacity of the human mind to investigate alternatives in imagination without acting them out which has made possible the great evolutionary success, so far, of the human race. But could not the extinction of an idea – a particular neural pattern in the brain – be compared in some respects with the death of a lymphocyte cell? The idea can of course always be recreated in identical shape in the brain; but so too can the lymphocyte in the body. The cells of our bodies are dying all the time in large numbers as a result of a process of selection through which we ourselves, as living systems at a higher level of organization, are enabled to survive. But is it possible that our own lives and deaths serve in their own way the purposes of some life at a higher level still, of which we ourselves can take no cognizance?

In giving expression to such speculative thoughts as these, I have a sense of moving precariously on the extreme edge of what can sensibly be said. I am reminded of Polanyi's comment that in certain circumstances symbolic operations can outrun the mind's capacity to understand their meaning. But I do not think we should regret trying to push as near to the edge as we can.

9

Knowing and Reality

IRREDUCIBLES

I have criticized Dennett for starting from the wrong place. By this I mean more specifically that the ultimate, irreducible things in terms of which he seeks to explain consciousness (and everything else) are the ones and zeroes of his computer's language, corresponding to what Democritus described as 'atoms and the void'. All explanation, however, has to be of one thing in terms of others, and of the others in terms of others still; there is nothing that we can know absolutely, on to which everything else can be hooked. And this is another way of saying that all that we know is encoded. We can translate, whether well or ill, from one code to another, but we cannot escape from codes and languages. We talk about reality, but we can only *know* it at a remove, in translation.

Yet is that quite true? It is true, by definition, of formalized, articulated knowledge. But what about tacit knowing? And must we not bear in mind Polanyi's warning that it is by means of tacit knowing that we appraise and validate our formalizations, not vice versa? Polanyi thought that we could achieve some contact with reality, but he did not imply that we could explicitly grasp 'that which may yet inexhaustibly manifest itself'. Our direct contact with reality, such as it is, grows out of tacit knowing, of which formalized knowledge is only an instrument. And this means that it grows out of consciousness, because tacit knowing has to occur in real time; it does not inhere in a text, it has to be personally created, whether from a text or otherwise.

I have quoted on an earlier page Polanyi's dictum : 'The formalization of meaning relies therefore *from the start* on the practice of unformalized meaning. It necessarily also does so *in the end* when we are using the undefined words of the definitions' (*PK*, 250). In other words the tacit component emerges at two levels, that of the whole and that of the subsidiary particulars in terms of which it is specified. To repeat a point made in Chapter 1, even an explicit text

has to be interiorized, lost sight of, made transparent, before it can be understood, before it can yield its focal tacit meaning. But that meaning is then one which grows out of the interiorization of all the particulars which have been explicitly articulated. It has to make a coherent whole of them, so that each is enabled to contribute its coefficient of tacit meaning; for it is only through their coherence in a whole that they acquire or contribute meaning. This is the process of 'sense-reading' (as opposed to the 'sense-giving' which produced the text in the first place).

My argument has been that all knowing takes place through the predicative steps of consciousness, it is a recognition of wholes built up through a process of tacit integration. The unit of consciousness is the whole predication; and when, for example, we make sense of a fragmentary utterance, we do so by completing the predication that has been begun, completing it not in words, but in terms of the conceptual forms that it is the function of words to convey.

The corollary of this argument is that our contact with reality can only be through the irremediable complexity of the predicative process. What this process subserves is the realization of a comprehensive entity which is ultimately unspecifiable, to use Polanyi's word. But this does not mean that we can escape from codes and languages. We can recognize and communicate a focal meaning only in terms of the coherence of subsidiary particulars; and these are always what Polanyi calls 'symbolic representations'. Even the constitutive elements of our perceptions are values registered in perceptual codes of considerable complexity, as the work of psychologists of perception such as James J. Gibson makes very clear. In the upshot all our conscious thoughts and perceptions reach our awareness in the form of grammatically structured predications, succeeding each other throughout our waking hours, and always involving a coherence of forms, relationships, qualities and intensities – all four in all cases.

These are the hyper-categories of consciousness. Within them there are many different categories, including for example hue or taste or sound timbre, or four-dimensional trajectories in space-time, or the category of melodic forms recognized in a melodic space; and within some of these in turn narrower registers of possibility may be established in particular context where close discrimination is needed. The general conclusion I draw is that any attempt to explain reality by reducing it to simple component elements,

though it may be valuable for many purposes and may help to build a useful world picture, cannot be a way of reaching and understanding reality in any absolute sense. Our starting point has to be the complexity of consciousness, not the elements out of which, on analysis, consciousness may appear to be constructed. We have to accept the ultimate unspecifiability of the wholes that we create. We cannot go behind values in the categories of consciousness, which are given, primitive, irreducible – yet still not to be regarded as bits of final truth. To go back once more to some often-quoted words of Polanyi:

> Just as, owing to the ultimately tacit character of all our knowledge, we remain ever unable to say all that we know, so also, in view of the tacit character of meaning, we can never quite know what is implied in what we say. (*PK*, 95)

Where does this leave us in relation to the theory of knowledge? I turn next to consider some of the versions of 'critical realism' espoused by scientists today.

POLANYI AND 'RESONANCE REALISM'

Scientists generally are now in retreat from the materialism, positivism, behaviourism and reductionism which were dominant over much of the twentieth century and still show themselves in many popular assumptions and attitudes. Most scientists (at any rate British and American scientists) who think about such matters seem to class themselves as critical realists, holding that their theories give them knowledge which in Robert Nozick's phrase 'tracks reality', and may gradually come closer to reality, though it can never give a complete and exhaustive account of what is there in the world. Edelman, with his 'qualified realism' is a not uncharacteristic example.

It is not easy, however, to find a clearly defined position to hold in this area without selling the pass of realism, as many would see it, and falling back into some form of idealism or relativism. John C. Puddefoot has recently drawn attention to the importance of Polanyi's version of realism, which he calls 'resonance realism', in this context.[1] It represents a relatively small and not very fully

developed part of Polanyi's philosophical work, but there is a strong case for the view that as long ago as the 1960s he pointed the way towards the solution of a problem which has now become more acutely topical in the 'postmodern' world.

It has been the achievement of modern philosophy, Puddefoot suggests, to enable us to see that:

> *nothing like* the correspondence theory of truth is tenable because there is nowhere to stand by which to assess the adequacy of a 'correspondence'; *nothing like* a ready-made (given) world can be known because everything we know is known through the *constructed* contingent media of language, theory, history, culture; *nothing like* raw self-authenticating facts are disclosed by experiments because data only *become* facts when *interpreted* in the light of theories which authenticate them.

But these negatives, Puddefoot argues, do not destroy the Polanyian view of realism. He suggests that Polanyi is close to Rorty in wishing to preserve newness and fruitfulness in all conversation; but differs from him in that, far from cutting the link between our conversation and reality, he insists on the faith and trust we must have in reality as a source of regenerating information. He lists some of the characteristics of 'resonance realism' as follows. It

> does not attempt to achieve a *correspondence* between theory (language) and reality, for such a quest is hopeless;
>
> does not rest content with a conventionalist coherence, despite insisting upon rigorous internal coherence, for that is too close to the kind of closure Rorty allows himself to be drawn into;
>
> does not attempt to avoid the constraints imposed by the successes of science, as many have done by espousing anti-scientific positions;
>
> does not adopt a passive philosophy of perception or evolution as is implicit in a Lorenz–Popper evolutionary epistemology, but draws upon the theory of active perception advanced by J. J. Gibson and followed up by, *inter alia*, Rom Harré;
>
> does not require an absolutist view of cultural history or progress;

> does not require a foundationalist or a transcendentalist stance;
>
> does not involve relativism of truth;
>
> does not rely upon a particular formalism, whether in mathematical or linguistic terms, and therefore admits incorporation of Polanyi's account of tacit knowing by which subsidiaries may be focused upon totalities to which they are essentially alien;
>
> rejects any sense of the absoluteness of the *given* while leaving room for a sense of the *rightness* of what we regard as the given;
>
> affords an opportunity to perform comparisons between more or less satisfactory formalisms and therefore offers us a way by which to compare the adequacies of versions in Nelson Goodman's sense;
>
> leaves room for a plurality of rationalities.

The essential point about resonance realism, he argues, is that it places the central criterion of our contact with reality *on the boundary* between the constructed world of human sense, culture and language and the discovered world 'out there' of which we can have no direct unmediated knowledge.[2] That criterion is the way in which:

> the richness of the external world, which has the capacity to draw us beyond our current sense of completion and adequacy to new imagination and new depth, imparts a sense of the inadequacies of current theories and ideas by resonating with our enquiries in a way that suggests the further tuning and retuning that will improve that resonance. A correct theory makes us feel at one with the world, but the limitations of our theories imply that we shall only ever feel partially at one. . . . What resonance realism requires is the essential involvement of the user of the theory in the process of using it, i.e. the sense in which we *know what we are doing* and are in this wise employing a skill as we investigate the world.

Resonance, he adds,

> embraces other important aspects of Polanyi's wider philosophy; the intimations of *fruitfulness* that a good theory must exude; the

conceptual *wholeness* that a good theory must display; the inherent sense of *rightness* that a good theory must employ.

Puddefoot is emphatic that resonance realism does not involve comparisons between theories and reality (which as such, is unreachable); but neither is it crudely relativistic; it prefers some versions to others because they produce resonances which ring truer to us in our personal judgment – not as isolated individuals, but as people who embody cultures and histories in unique, contingent ways. A scientist, as a member of a scientific culture, weaves his experiment, the theory it embodies, and his professional and personal hopes and convictions into the extended web of beliefs, meanings and usages that constitute a linguistic community.

In my psychological terms this suggests that what rings true for us is that which can evoke the widest possible unified, and ultimately harmonious, resonance across the mind-manifold. If the implications of the logical structure do not hold together, there will be a harshness in the resonance which shows that something is wrong. But, just because we are talking of a widespread resonance at the unconscious level, drawing elements out of the latent unconscious into the active unconscious, the potential spread of association through metaphor and metonymy extends beyond logical structures to the whole of the individual's mind, shaped as it is by personal history and collective culture.

I think it is this element of unconscious resonance which connects the scientist's *aesthetic* sense of the beauty and truth of a theory or equation with our more general aesthetic sense of the beauty and truth of a work of art. Speculatively one might suggest that the difference lies in the fact that the scientists's work has to be related directly to an external reality, what Puddefoot has well described as 'the external world as an everlasting source of regeneration', while the artist's work is related in a more indirect way to external reality. Artists, too, are concerned with establishing the widest possible unified resonance in the context in which they are working, but it is an imaginative context; that is to say, they are exploring in full freedom of imagination the possibilities and potentialities of the personal, historical and cultural web of beliefs within which they live; yet this is still an aspect of reality, and one which is constantly nourished and expanded by the 'everlasting source of regeneration' through the unfolding experience of individuals and communities.

In this way it can be argued that, whether as scientists or as artists or as ordinary people in the street, we are dealing with a true, shared reality. All our formulations are contingent, and constrained by the limitations of human minds, as well as by our particular historical, cultural and personal situations. But this does not imply total relativism, the view that any judgment is as good as any other. The greater the whole web or manifold to which our understanding is related and within which it is unified, and the more refined and clarified the structure, the purer and more beautiful the resonance – then the greater the right we have to prefer that understanding to another.

ROM HARRÉ AND 'REFERENTIAL REALISM'

Another important attempt to establish, from a somewhat different angle of approach, a defensible modern realist position is the concept of 'referential realism' developed by Rom Harré in his book *Varieties of Realism* (*VR*). I cannot try here to summarize a long and complex argument, but it may be useful to pick out a few points which have a direct relevance to our discussion.

Harré makes use of the theories of the psychologist of perception James J. Gibson. For Gibson sensations do not specify physical things, they only specify the current state of the sensory organs, through which an organism picks up information from the 'ambient array'. This is a flux of energy shaped by the presence of both the perceiver and that which is perceived. What it offers is not details of the properties of objects, but 'higher order invariant information which specifies what an object *affords* for our actions'. This is immediately reminiscent of Locke's secondary qualities which are not intrinsic properties of material things, but their 'powers', the effects they produce through our sensory apparatus. For Gibson, as for Schrödinger, there are no primary qualities through which we have direct access to reality. Even shapes are 'higher order invariants' picked up from the array. As Harré puts it,

> Gibsonian theory has the eight-corneredness of a cube expressed as a mathematical apprehension . . . . the same kind of act as that in which one sees the way of a proof. . . . Since the flow of energy

> is in principle inexhaustible, so is the information potentially in the array. . . . The world as we perceive it is an arena for both actual and possible action. This follows immediately from the fact that it is largely perceived in terms of affordances. Furthermore different creatures will pick up different Gibsonian information from it. (*VR*, 158–9)

Perceiving, as he says earlier, is an act not a response, an achievement not a reflex. An affordance is defined as 'the disposition of an unspecified substrate to manifest a definite interaction with a highly specified interactant'. Through the rather obscure Gibsonian terminology it is possible to pick up some interesting possible affinities with the Polanyian theory of tacit knowing. For Polanyi what we perceive focally is a comprehensive entity or Gestalt, grasped as a whole, as when 'one sees the way of a proof'. It is constructed by the perceiver on the basis of subsidiary sensory clues which are only given meaning as they find coherence in this 'higher order invariant'.

The core of Harré's book could be said to be his interpretation of Niels Bohr's philosophy of science. He suggests that 'there is a genuine parallel between the Kantian ontology of phenomena and that proposed by Bohr. For both, phenomena are created by the application of something humanly created to something which, as far as human thought can go, must be taken to be undifferentiated'. This *Ur-stoff* Harré calls 'glub', to avoid the possibly misleading associations of other words. All we can say about it is that it has certain dispositions or affordances which 'permit shaping in this or that way, as apparatus would permit'. A phenomenon is a blend of what the glub affords and what the apparatus admits, and no distinction can be drawn allocating some features to the one and some to the other. Phenomena are not to be confused with independently existing states of nature. In physics 'the principle of complementarity reflects the fact that we can make two kinds of glub-squeezing apparatus – so there are particle-like electron phenomena, and there are wave-like electron phenomena' (*VR*, 305). (As a non-physicist I am drawn to wonder whether there is some correlation here with the point made in an earlier chapter that the same information can in certain circumstances be recognized alternatively as a form or as a set of digits.)

Harré points out that for Kant phenomena must display properties which can be thought about in terms of the concepts of his

finite list of the categories of experience; and the counterpart of this is Bohr's insistence that 'however far the phenomena transcend the scope of classical physical explanation the account of all evidence must be expressed in classical terms' (*VR*, 305). However this does not alter the fact that in dealing with quantum mechanical phenomena, although we have to take cognizance of the relevant measurements in terms accessible to normal consciousness (such as tracks in emulsions), novel concepts have to be introduced to create order among the results of such measurements. These are the strange and novel concepts of particle physics, including strangeness, isospin, charm and many others. But we have to bear in mind that the phenomena they enable the physicist to describe are still no more than joint affordances of apparatus and the world. They do not give us a direct acquaintance with things as they are in themselves.

As Harré says in a later paper 'Physical Properties',

> In ascribing a property to the physical world on the basis of our sensory experiences we humans need not suppose that the state of the world producing our experiences resembles those experiences in any way at all. All we need to do is to ascribe a tendency or power to the world to produce that state of sensibility (or experienced quality) in us. The distinction between primary and secondary qualities vanishes from the metaphysics and epistemology of the physical sciences.[3]

AN APPROACH TO TRUTH AND REALITY

Harré's referential realism could perhaps be described as a Kantian epistemology brought up to date. It remains a form of realism because its affordances do give information about the real world, even though the knowledge they impart is always constrained or shaped by the nature of the apparatus used. In discussing Bohr he refers exclusively to scientific apparatus, but the same would apply to results achieved through the apparatus of our senses. As he says on an earlier page, 'the result of perceiving something with the help of instruments is as much perception as the kind of awareness of things we can achieve with unaided sight, hearing and touch'. Polanyi would agree; and he would include with the instruments the conceptual framework by which we are guided. 'As observers

or manipulators of experience', he says, 'we are guided *by* experience and pass *through* experience without experiencing it *in itself*. The conceptual framework by which we observe and manipulate things [is] present as a screen between ourselves and these things' (*PK*, 197). Furthermore 'the structure of knowing . . . . fuses our subsidiary awareness of the particulars belonging to our subject matter with the cultural background of our knowing. . . . All thought is incarnate; it lives by the body and by favour of society. But it is not *thought* unless it strives for the truth' (*KB*, 134). (The last sentence gives one pause; but I would understand it on the basis that every predication is part of a purposive cycle concerned with identifying and achieving some purpose in the real world.)

On many topics the views of Harré and Polanyi, though often expressed in very different terms, seem to be closely compatible. There are at least affinities in their views on natural kinds and taxonomy, on 'comprehensive entities' and 'higher order invariants', on the role of the scientific community, on the moral order of science, and not least on the nature of truth and reality. For Harré '"truth or falsity" of statements is replaced by "existence or non-existence of entities at the heart of a specification of scientific realism"' (*VR*, 67); and Polanyi comes to the same point by a different route when he says: 'All the time his attention is fixed on the meaning of the clues he has collected so far, while he is feeling his way towards new ideas and new evidence, by following his sense of approaching discovery' (*KB*, 171). For Polanyi 'All truth is but the external pole of belief' (*PK*, 286). At another point he says that 'truth lies in the achievement of a contact with reality' (*PK*, 147); and the test of reality is that it reveals itself in an indefinite range of yet unforeseen consequences. He acknowledges however that the veridical quality of the Copernican system could not be its *subsequently* proved fruitfulness. 'The mark of true discovery is not its fruitfulness but the *intimation* of its fruitfulness." This intimation rests on the power of intellectual beauty to reveal truth about nature; but this revelation in turn depends on a prior empirical groping for the meaning of the facts, what Einstein called *'ein intuitives Heranfühlen an die Tatsachen'*.

We are back with the core of tacit knowing: a *personal* intuition of focal coherence achieved through an indwelling of particulars subsidiarily known. We recognize truth through an intuition dwelling in experience. Yet 'we can never tell exactly what we mean, or even if we mean anything at all. . . . Indeterminacy of meaning is not

eliminated, but only restricted, when we eventually decide to accept a theory as a true statement of something new about nature. . . . Such a belief can have no bearing on reality unless its scope is still left indeterminate' (*PK*, 150). One pole of the truth lies, if we revert to Harré's language, in the glub; the particulars that we indwell are no more than joint affordances of apparatus and the world; we cannot acquire determinate knowledge of things as they are in themselves.

RELATIVISM

Any theory which suggests that all knowledge is personal in nature is inevitably liable to be described as relativist; and the description must be in some sense accurate. It is hardly an exaggeration to say that the attempt to come to terms with the fact that there is no clear-cut, secure and absolute intellectual foundation for our knowledge of the world or for our moral values has been the most characteristic feature of the second half of the twentieth century, the era of postmodernism. People have often differed in the past about the foundations of our knowledge and our values, but it is only recently that the recognition has become widespread that no such foundations exist, at least in terms that can be expressed in propositions. This has led sometimes to a sense of confusion and despair; sometimes to an anarchistic or nihilistic exaltation of individual choice and self-fulfilment; sometimes to the dogmatic egalitarianism of 'politically correct' views on political, social, moral and aesthetic issues; often to angry fundamentalist resistance and denial, whether from scientific positivists or from traditionalists of other kinds; and often to the anxious search for new foundations which can be adopted without sacrifice of intellectual integrity.

There is good reason for this anxious search, since meaning depends on purpose, and without some foundation for faith and hope it is difficult to avoid that sense of meaninglessness which is a death of the soul. The discrediting of scientific positivism, which so many people thought of as replacing religion, has in fact provided a new opening for religion itself. So far this has tended to lead either back into anti-scientific fundamentalism or forward into exotic religiosities, with fashionable charms but little intellectual backbone. However if philosophical theology can rise to the challenge of the

present situation, there is scope in the longer term for a new intellectual synthesis which can relate the unchanging mysteries of creation to this restless, rootless, narcissistic postmodern world.

Meanwhile in different quarters varying approaches to the problem of relativism are being developed. I have already given an account of the Polanyian approach of John C. Puddefoot. This links on to the important work of T. F. Torrance in developing a scientific theology and a theology of science which take rigorous account of contemporary developments, while not relinquishing the possibility of contact with reality.[4] Perhaps the most currently influential perspective on relativism is that of French post-structuralism and deconstructionism, which could be said to have grown out of the semiotics of Saussure and the structuralism of Lévi-Strauss and Piaget. Analytic and post-analytic philosophy in Britain and the United States, by contrast, has its roots in the language games of Wittgenstein and the generative–transformational grammar of Chomsky (itself much influenced by the development of the digital computer); but, although its style is very different, it offers some interesting parallels with the movement in France. As George Steiner has put it in his remarkable and courageous book *Real Presences*,

> Together with linguistic philosophy, modern linguistics, this is to say the systematic, often highly formalized study of lexical, syntactic and semantic codes, has placed language at the very centre of epistemology, of social anthropology, of cognitive psychology and poetics. . . . [But] linguistics after Saussure has simultaneously . . . made of this centre a 'formality'. 'Erasure rules' are not an object of love.[5]

There has been a fundamental shift, he says, 'from a referential to an internally-relational semantics'. On the basis of its analysis of the word, deconstructionism denies any ultimate meaning to the word. The age of the meaningful sign, of 'logocentrism', as Derrida significantly recognizes, has been essentially theological; but for deconstructionism there is no God, no *Logos*. As Steiner says, deconstructionism dances in front of the ancient Ark, but it knows that the Ark is empty. There is clearly a parallel here with the way in which Richard Rorty seeks to continue 'conversation' about philosophical subjects in an ironizing way, but without apparently any real hope of getting anywhere.

A strong response from within the philosophical camp has been that of Rom Harré. I have already given a brief account of his 'referential realism'. In a recent article he has drawn an illuminating distinction between types of relativism. There is a 'benign' relativism, he suggests, which recognizes, first, that different aspects of a person-independent world are revealed by the use of different kinds of instruments and different kinds of perceptual systems; secondly, that we can and should try to get empirical results that are as objectively grounded as possible; but thirdly, that we now have good reason to believe that no one instrument/conceptual system could give a complete account of the empirical grounding of what can be afforded by some natural entity; and fourthly that in the same way no set of instrument/conceptual systems could give an exhaustive account of the grounding of all possible affordances to people and their apparatus. This is a cautious statement which keeps a strong hold on reality. But there is also, Harré argues, a malign relativism which, from the same observations, arrives at the conclusion that different instrument/conceptual systems bring different aspects of nature into existence. 'In this observation', he notes, 'the term "nature" can be deleted without loss of content. It plays no role'. He points out the objection to this move:

> that it ignores the necessity of grounding dispositions in some state or other of the world independently of human sensibility. Without this grounding condition we have no criteria for the identity, individuation or continuity of dispositional properties, without which even the dedicated relativist has no world at all.[6]

Harré takes his realism seriously. He claims that his 'Bohrian affordances' 'allow us to accept the limitations on our scientific hubris that are expressed in the four principles of benign relativism, without falling into the follies of the anti-realism of malign relativism'.

It seems to me that the views on relativism of Polanyi, Puddefoot, Steiner, Torrance and Harré, are fundamentally compatible. My own approach is closely related to theirs. It is rooted in ideas about thought and language. I think it is a crude but fair approximation to say that modern linguisticians and those who have built upon their work may have begun with a distinction between signifier and signified, but they have never been able to make much of the signified and have concentrated their attention on the

signifier. Saussure asserted unequivocally that language is a system of differences in which all elements are defined solely by their relations with one another.[7] In other words they carry no meaning of their own. Lacan very explicitly asserts the dominance of the signifier; as Bowie has said of his seminal paper on 'The Function and the Field of Speech', 'the Symbolic relentlessly preordains and organizes human experience, but on the other hand it cancels experience. It creates meaning yet also withdraws it'[8] – something very characteristic, I would suggest, of postmodernism 'dancing before the Ark'. Chomsky in a different way gets embroiled in the phonetic structures and deep structures of language at the expense of any effective engagement with semantic reference to the world. Steiner is right to talk of a shift from the semantics of reference to the semantics of internal relationships.

As it seems to me, having recognized that words do not have direct and unequivocal access to an external reality, these writers tend to assume that there remain only two alternatives: either a conjunction of words with ideas of a Platonic fixity (a position which has to be rejected as untenable); or the flickering dance or conversation of postmodernism – playful, ironic, but in its subtler practitioners, as Steiner says, instinct with sadness. What I want to suggest, in contrast, is that the signifier, far from being dominant, should be recognized as no more than the servant of the signified. It is relevant, moreover, that there are two levels of the signified, and therefore of meaning, that of forms and that of reality. To recapitulate some thoughts expressed earlier, I believe that we think in terms of a language of perceptual and conceptual forms, elements of which we build through predicative relationships into forms-as-a-whole. The forms are infused with qualities and intensities of sensation and emotion, which in the case of conceptual forms (ideas) are derived from their associations. The vocabularies of verbal languages link conceptual forms to words. We use verbal language to communicate a comprehensive form as a predication, by breaking it down into a linear sequence of sub-forms linked to words. From this the hearer or reader can reconstruct grammatically the multidimensional form-as-a-whole. Pictures and diagrams can also be used in some circumstances to communicate ideas in a more synchronic, non-linear way. I believe that some capacity and propensity to learn verbal languages is innate or 'hard-wired' in the human being and therefore cross-cultural. If it was not, we could hardly translate from one verbal language into another, whereas in prac-

tice we can do this fairly effectively, particularly with conceptual forms and their relationships – qualities and intensities can be conveyed only in a more indirect and approximate fashion.

In the present context I would emphasize, however, that none of this offers any 'privileged access' to reality. Codes and languages, hard-wired or otherwise, do not themselves contribute to what we know of the world; they only provide the terms in which we know it. The medium is *not* the message. Yet, paradoxically perhaps, we can never disentangle the message from some medium or other. We may in some circumstances be able to translate it from one verbal language to another, or, for instance, re-express an algebraic formula as a graph; but we can never extricate a pure message from its expression in some code or language. The capacity to perceive or conceive forms may be innate, but this does not mean that the forms themselves constitute, or even approximate to, anything eternal or ultimately real. They are merely values on registers of possibility, vocabulary items, text. It seems to be an aspect of the human condition that we know one thing in terms of other things, and others in terms of others again, and so on *ad infinitum*. There is no absolute knowledge on which this regress can be hung, or truth can be founded.

Yet there is reality and we encounter it all the time. The fact that we cannot disentangle the message from the medium does not mean that there is no message. Rorty, as it seems to me, rightly rejects epistemology conceived as a method of arriving at necessary truths about the world. But in replacing it with what he calls conversation, even within the evolving continuity of a cultural tradition, I think he runs the risk, like the existentialists whom he admires, of disintegrating our understanding altogether into ultimate meaninglessness and absurdity. I accept that different discourses are not commensurable within some mythical overarching absolute discourse. But in different situations we can sense truth and grope after it in the way described by Polanyi and Einstein. In works of art we can sense what Steiner calls 'the irreducible autonomy of presence, of "otherness", in art and text which denies either adequate paraphrase or unanimity of finding'.[9] On this difficult frontier of what can intelligibly be said Torrance writes well of 'the unformalizable *forma formans*' which calls our formalizing activities 'into contrapuntal sequences and patterns of an open texture through which it bears regulatively but inarticulately upon our knowing and thinking'.[10] As Polanyi put it, truth is the external

pole of belief. Individual truths and individual presences, as we can come to know them, are always incomplete. They acquire meaning within the purposive cycles of our intentionality; but our particular purposes themselves make sense only within some greater purpose in living; and correspondingly, such individual truths and presences make full sense only within the ultimate truth and Real Presence of the divine. There is still a sense in which this is one universe – not in terms of discourse, not in terms of philosophy, not even in terms of science, but in some manner beyond words and beyond the categories of consciousness. This is where we should remember Harré's 'nature', or better the One of the mystics,[11] to which Rorty refers. 'In him all things hold together' says St Paul of the cosmic Christ.[12] Without God there can in the end be no intentionality, no presence, no truth, no meaning. But it takes more than philosophy to bring us to God.

10

The Here and Now

THE GRAMMAR OF REALITY (1)

There remains for me one important aspect of our encounter with reality which is not effectively covered by the theories I have discussed, nor, so far as I am aware, by the comparable theories of such thinkers as Popper or Kuhn.[1] This is the difference between the living, inescapable actuality of what each of us experiences in the immediate moment Here Now, and the derived, passive reality of our broader knowledge of the world.

The root of the difference seems to lie in our sense of real time passing. If I look out of the window I construct a perceptual predication which has the actuality of present experience. If I remember and think about that experience even fifteen seconds later, I am still living in the present, but my present experience is, as it were, made transparent and the predication at the focus of consciousness is a reliving of what happened in the past. And there is a difference. In the first case possibility is being resolved into actuality in real time, before my eyes. In the second case a memory stored as a synchronic whole is being recreated, as it were, in my consciousness by the transit in real time of my attention. In the first case the experience is one of 'objective' reality in the sense that it is a joint affordance of my sensory apparatus and the glub (to use Harré's terminology). In the second it is 'subjective' in the sense that it is not original creation, but a recreation derived from my memory store.

What then if I imagine a small green man coming through the window? This is an experience of original creation, but it is still 'subjective', it does not directly involve any affordance of the glub. But consider another case again. What if I creatively understand for the first time a well accredited scientific theory about the nature of the world? This is, for me at any rate, a new discovery, even if others have discovered it before. It is a Gestalt, giving coherence to particulars which are joint affordances of other people's personal and conceptual apparatus and the glub. It is therefore an

experience of 'objective' reality, though at second hand; and it is made available through my present experience, much as the experience of watching a football match played yesterday is made available to me by a video replay on television. And it is evident that a vast proportion of everything we know about the world falls into this category of 'objective' information accumulated by our culture and made available to us at second hand.

This suggests that we have to distinguish between experience: (i) of the objective world perceived through the senses, (ii) of a subjective world of memory, thought or imagination, and (iii) of the objective world grasped at second hand, that is, recreated through subjective memory and imagination from information communicated (through signs, codes and languages) by other people, as well as from personal experience, and stored as a sort of model in our latent unconscious. As it happens, both Popper and Harré have proposed theories about Worlds 1, 2 and 3 and Realms 1,2 and 3 of experience respectively;[2] but it would be confusing to introduce a discussion of these here; the division I have made is a little different from either of the others, essentially because it is concerned in the first place not with the status in reality of the objects of our knowledge, but with the psychological processes involved in three different kinds of knowing.

As I have already suggested, the differences are related to our consciousness of real time passing; and they are significantly reflected in the tenses we use in our languages. It seems likely that animals live almost all the time in the present tense. This does not mean that they do not have memories and use them; but it seems unlikely that when a dog joyfully greets his owner after a separation, he ever focuses his attention on images of the past. Rather such images are subsidiary particulars which contribute to the focal experience of seeing his owner again, and particularly to the emotional coloration of this experience. This suggestion is admittedly speculative, but it has a degree of plausibility; in fact it corresponds closely with Edelman's theory of primary consciousness. As Polanyi says, 'our perception of living beings consists largely in mentally duplicating the active coordinations performed by their functions.... Hence our knowledge of biotic phenomena contains a vast range of unspecifiable elements' (*KB*, 150).

A human being, however, can and often does focus on a reliving of the past in which, as I have indicated, the attention makes a transit in real time across a memory stored in synchronic form. He

or she can also focus similarly on the imagined future. The attention synthesizes experience from a particular point in time and space. It represents the self – by which I mean in this context something very like Kant's featureless transcendental subject of thought, which 'is only the representation of that to which all thinking stands in relation'.[3] When the focus of attention is on a past event, or on an imagined future event, or on an event which is fictional or hypothetical, the central temporal transition at the hinge of the predication does not stand in the same relation to the self's time as it does when the focus is on something Here Now. Consequently our languages have past and future tenses, and also conditional and subjunctive tenses which come into play when the time focus of a subordinate clause is different from that of the main verb.

Languages vary up to a point in the ways in which they express or imply these 'subjective relationships', as I call them; but the distinctions are always there as part of the underlying grammar of thought which is translated into words in varying ways. In Chapter 3 I suggested that the structuring of consciousness was based on spatio-temporal and logical relationships. I omitted at that point this third category of subjective relationships, because they are not in fact concerned with links between forms, but rather with the link between the self and the form-as-a-whole, the subject elaborated, which is the object of our focal knowledge at any point. But they are just as essential to our awareness of reality as the other relationships through which consciousness is structured. They include not only relationships of tense but also relationships of person; and significantly both are expressed grammatically in the verbs which reflect the central transition of each predication in consciousness.[4] Furthermore it can be argued that they should include, in addition, two further subjective relationships, that of attention itself, and that of choice or decision, whereby the self takes a step of regulation by opting for one imagined course rather than another.

THE GRAMMAR OF REALITY (2)

In the light of these psychological considerations it may be useful to try out another, and somewhat different, approach to our apprehension of what is real and what is not. Perhaps the first point to make is that, since 'subjective' relationships are essential to

consciousness, we cannot expect to have entirely 'objective' knowledge of anything. There may be a vast mass of culturally and scientifically accredited knowledge about the world which is common to all who have access to it. But not only did it all have its origin in somebody's consciousness, it is all mediated through the languages and presuppositions of a culture. Moreover when any particular item is brought to consciousness it has to acquire, through the present existence and purposive context of the person who takes cognizance of it, the secondary qualities of mood or emotion which give it life, and without which it cannot be understood.

Nevertheless we do build up a great body of knowledge about the world which we regard as 'true'. What do we mean here by 'true'? I think that in ordinary psychological terms we mean reliable: we are prepared to use these facts in trying to achieve our ends; they offer *conductivity* within predicative structures to purposive, and hence causal, thinking. Why do we trust them? Because they have been tested by ourselves or, as we think, by others who accredit them. Even so, our knowledge is always fallible; scientific theories have a range of validity which can never be exhaustively explored.

Belief in this sense is not a proposition superimposed upon other propositions ('I believe that *p*' and so on), but an impression of the conductivity of a given idea in a given situation to purposive thinking. That is to say, it reflects a reading of threshold levels in the mind, which have themselves been established by past testing or accreditation. The evidences of past testing or accreditation do not reach us individually, but in a collective, synchronic way, as qualities and intensities infusing our experience of the ideas in question.

Accepting these limitations, how do we distinguish (again in psychological rather than strictly philosophical terms) true facts from false? Here we have to make some prior distinctions. A proposition can refer to the existence of something in nature: this cat is real, it exists, while that (Cheshire) cat is not real and does not exist. Or it can refer to a general statement about a regularity of nature: the tides are caused by the gravitational pull of the moon. Or it can refer to a logical or analytical truth, which is a truth of classification: snow is white.

In the first case we are talking about an existential reality; linguistically the definite designation of the cat by means of a demonstrative 'this' makes the point clear. And we decide the answer by

reference to our space-time map of the world and history; either it has a location on that map or it does not. If your map differs from mine on the point I may have to look into the evidence and perhaps alter my own map. The scientific community builds by degrees a collective space-time map of the cosmos, but that map too is subject to alteration if new evidence appears; and individuals and communities often have somewhat differing versions of the collective map: there is no master version.

In the second case we are talking about general statements concerning regularities of nature. These are about instances of classes of events, and consequently their designation is indefinite or numerical. (In the example above 'the tides' is understood as 'all tides', not any particular tides.) We identify the classes concerned by reference to the mind-manifold's second system of ordering, that of classification under the markers provided by words or other signs or symbols; and we construct from them models of the regularities in question (what Harré calls analytic analogues or models). We look for explanations by matching these to what Harré calls source analogues or models; in this case we would refer as a source analogue to the moon's gravitational pull. Having established a plausible explanatory model, we test its 'truth' by making predictions based upon it, related to the space-time map. Finally we check our predictions by observation. (Alternatively we can rely upon other people's predictions and observations.)

When it comes to analytic statements – the third case – their truth concerns exclusively the interrelationships of given classifications; and this is a matter of logical compatibilities. When we build up a set of forms to create a higher order form, we may have to face the question whether they successfully generate a form-as-a-whole, a comprehensive entity, or whether they fall apart because the implied logical relationships do not hold. (It is perfectly possible in such a case to recognize that something is wrong without being quite sure what it is.)

In all three cases, however, our impression of the truth of an idea, otherwise our belief in it, can be understood as a reading of its conductivity in a given context of purposive model building, a process which is part of the process of purposive thought, as discussed in Chapter 4. This is a psychological understanding of belief and truth, one which in practical situations, as I see it, is all that we need or can offer. The metaphysical question of the relation of such beliefs or truths to reality is a different issue to which I now return.

THE GRAMMAR OF REALITY (3)

I have offered in very broad terms a psychological account of how we deal with reality and what we make of it. But in the end what is reality? If we conceive it as things known, I do not think we can improve upon Harré's description of the joint affordances of apparatus and the glub. But it is necessary also to take note of the overwhelming reality of the present moment, which we cannot doubt *qua* experience, however we interpret what it is experience *of*. This undoubtedness of Me Here Now in time passing is perhaps the most natural criterion by which to judge what we mean by the word reality. Yet our earlier analysis has shown that such consciousness of present reality cannot stand on its own. There is no perception without thinking. The sharp forms, qualities, intensities and relationships of the immediate arena of attention have to acquire shadows, they have to be projected upon shadowy classifications before they can be consciously seen, before actuality can be recognized as emerging from potentiality, before in-form-ation can take place, before anything can be understood. And these classifications are quasi-topological forms drawn from beyond the arena. Without them there can be no identification even of the continuity and consistency of objects. Our recognition of Here Now in time passing depends on an awareness of an extrapolated There Then, our knowledge of the world, which is stored in synchronic form under the maps and markers of our latent unconscious. From there, summoned by resonance with the affordances of the present, the necessary background of potentiality emerges, against which we make sense of the perceptual or conceptual actuality before us. This background of potentiality is essential, and for that reason, in laying stress on the uniqueness of Here Now, I have no wish to minimize the importance of our 'objective' knowledge of the world beyond the arena.

Our knowledge of the world clearly depends upon memory, and so upon some attribution of reality to the past. Our idea of the possibility of space beyond the immediate arena of perception depends upon the existence and reliability of memories; and even our apprehensions of the future depend entirely upon extrapolation from the past. This past is synchronic; it has already happened, it is not in time passing; and the same applies to our whole picture of the world and history, including the scientific account of nature. The question may be asked: does this world exist, apart from the maps and models in our own respective memory stores from which bits

of it are evoked in different contexts? The answer has to be yes, because it is the ground of our anticipations of the future, and we are constantly using and testing these anticipations in innumerable ways. This world of human construction does not yield affordances to us directly; we have no direct contact with the past or with any part of the world outside the range of our senses or our instruments; but on the basis of our models we can predict future affordances of the glub, beginning with such basic predictions as that my table will still be there when I turn round to look at it. Yet what each of us has to work on is only a map supplemented by a variety of predictive models, we do not have direct access to the wider world. Our map and our models are valid and useful guides, but they are not infallible, and there is always something indeterminate about their range of application. They lack the secondary qualities which we have, as it were, to breathe into them from our present experience before we can bring them to consciousness. Above all they are not the real thing, they are synchronic constructions built out of values in the given categories of human understanding, encoded as forms. What they model will always be beyond us, apart from the inescapable reality of Here Now.

Is there anything more that we can say about Here Now? It includes time passing, and with it the sense of consciousness, purpose, meaning. None of these are at home in the generally accepted scientific account of nature, which finds it hard to escape from the concept of a deterministic, block universe (or block of infinitely many universes) in which the sense of time passing is a delusion. Latter day positivists are still trying, though with little success, to account for consciousness as nothing more than a neurological phenomenon. Democritus, however, it will be remembered, as quoted by Schrödinger, offers the response of the senses when they are confronted by the assertion that there is nothing but atoms and the void: 'wretched mind, from us you are taking the evidence by which you would overthrow us? Your victory is your own fall'.[5] The whole edifice of our knowledge of the world is built out from the conscious experience of individuals in the present moment. To treat the edifice as real, but at the same time to downgrade the reality of immediate experience, as Sir Alfred Ayer has explicitly done,[6] is to saw off the branch on which you are sitting. We need both; but how do we relate the two?

I come back to potentiality and actuality. All our knowledge of the world, common sense as well as scientific, is based on noting

regularities. A regularity, a rule, a law, a constraint, these can all be described as restrictions on the possibilities of transition from a given state. The laws of nature reflect such restrictions of possibility, and thereby, in a given situation, they establish an area of potentiality within which transition is possible. In Chapter 6 I discussed the theories of Polanyi and others concerning the emergence in nature, through a hierarchy of levels of organization, of additional 'boundary conditions' or 'higher controlling principles', imposing at each level of organization – that of physics and chemistry, that of machines, that of organic life and so on – additional restrictions that shape or constrain what can happen, as it were from the top down. On this basis Polanyi argues that the mind, being at a higher level, harnesses neurophysiological mechanisms to its own ends, and that, although it depends on them, it is not determined by them (*KB*, 238). This may well be true, but, even so, it does not follow that the additional conditions altogether determine what happens. They may narrow down further the range of possibility, but even at the highest observable level, that of consciousness, they are still restrictions, not positive determinants.

At this juncture theorists of biological and cosmological evolution are liable to invoke the twin gods of chance and necessity. The laws of nature, together with any additional controlling principles of the type described by Polanyi, provide the element of necessity; and this, acting in relation to initial conditions of one kind or another delimits future possibilities, and so establishes an area of potentiality. This point is as far as our understandings of the world, whether scientific or commonsensical, can take us. After this point something not strictly predictable happens. We may make statistical predictions based on past experience about the likelihood of particular outcomes; but absolute certainty about the future can never be achieved. Yet in the *event* the area of potentiality is resolved into actuality. To say that the final outcome among possibilities is a matter of chance, that it is randomly determined, is merely a misleading way of saying that we are faced with a total mystery. It might make better sense to say that we are faced with creation; but even that presupposes an active creator and a causal process beyond the arena of our perceptions, for which, by definition, we have no evidence; for if we had the evidence it would have to be expressed as a further rule or constraint, restricting the area of potentiality. This is why Edelman is right to say that science cannot describe individual or historical experience adequately, though it

does provide a satisfactory description of the *constraints* on experience. We cannot improve upon the anthropomorphic metaphor of a creator, but we need to acknowledge that here we are faced with reality itself, for which no articulation can be adequate. It may be relevant to recall that the name by which God names himself out of the burning bush in the Book of Exodus is: I am.

It is through human consciousness that we become aware of actuality, of creation happening. It is through our own awareness of that awareness that we can achieve what was called by Jean-Pierre de Caussade 'the sacrament of the present moment'. And perhaps, when we take decisions in conscious self-determination that affect the world and our lives, we may find ourselves making our own minute contributions to the miracle of creation, sharing in the activity of the creator. Our decisions are taken, mysteriously, between one predication and the next, where there is no experienced duration. They seem to be outside time.

Appendix

A Note on Grammar

We take as building materials relations and relata. The relations unite the relata; the relata are the meeting points of the relations. The one is unthinkable apart from the the other.

Eddington

I use the word 'grammar' in a precise and limited way. I would define conscious life as the continuous focusing of complexity into successive perceptual and conceptual systems, in each of which a subject element or subsystem is related to a predicate element or subsystem over a transition in time. Grammar consists of the rules by which these systems, or, as I call them, predications, are built up.

Grammar is divided traditionally into accidence and syntax. Accidence is the set of rules by which the substantive, information-bearing elements of a complex are classified according to their roles in grammatical construction. Syntax is the set of rules by which the elements, once classified, are brought together. Accidence classifies the mortise and tenon as such, syntax establishes the joint which they make when two parts of a chair (say) are fitted together. The rules of accidence define roles; but one role has no meaning except in relation to another. The relationship and the pair of roles between which it holds mutually define and give meaning to each other.

One substantive element may be involved in more than one relationship, just as a chair leg may be joined to more than one of the other components of the chair. Thus it can be said that a substantive element may carry more than one role. A set of complementary roles combined together is a syntactic construction; and the rules of syntax define particular types of syntactic construction by defining what roles go together, and in what way, in order to produce them.

Syntax is hierarchical. That is to say, individual syntactic constructions can themselves form the substantive elements of further syntactic constructions at a higher level. The chair leg and the strut

assembled together by a mortise and tenon joint can, as a whole, be assembled with other elements, simple or combined, to form a larger construction – the chair. The syntactic construction as a whole at the higher level conveys not only the substantive information of its elements and the constructional information of its accidence and syntax, but also new substantive information, unique to this particular whole, which emerges at the higher level. Thus the chair has a shape as a whole which is additional to the sum of its parts and the constructional rules by which they were combined; it is the particular substantive effect of this particular combination of elements taken as a whole.

To put it another way, grammar consists of the rules by which substantive elements of information are assembled to form larger substantive constructions; and these convey not only the information due to the elements and their relationships, but additional substantive information due to the constructed wholes (which in turn have a reflexive shaping and elaborating effect on the information conveyed, in this context, by the individual elements). The total information which these wholes convey when fitted into a wider context is their meaning. Meaning is information used functionally by persons in relation to a purpose.

The substantive elements of any complex are themselves wholes; and there are three kinds of wholes: undivided wholes, complex wholes (which, like the chair, are wholes built up of component parts integrated into singular systems) and plural wholes (which, like flocks, or crowds, or repertoires, are groupings of undivided or complex wholes that are in some determinant respect alike). Subjects may be undivided or complex or plural; but every predication is itself a singular complex whole in which subject and predicate, as subordinate wholes, are integrated over a transition in time, as components of a wider system.

Notes

Chapter 1: Some Aspects of Tacit Knowing

1. Polanyi was familiar with the work of the *Gestalt* psychologists, particularly Wolfgang Koehler, and also with early stages of the work on perception of James J. and Eleanor Gibson.
2. An interesting sidelight on the theory of focal and subsidiary knowing is thrown from the angle of neurology by the occurrence of certain types of agnosia, as recorded by Dr Oliver Sacks. In these cases patients, as a result of damage to certain areas of the brain, have lost the capacity to recognize the wholeness or identity of a thing, as distinct from its subsidiary particulars. The deficit in 'gnosis' may relate to one of the senses without the others being affected. Thus Mr P 'could construe the [visual] world as the computer construes it, by means of key features and schematic relationships. The scheme might be identified – in an 'identikit' way – without the reality being grasped at all'. If shown a glove, Mr P could describe its features, such as its 'five outpouchings', but could not recognize it as a glove. Yet his highly developed musical capacities were unaffected. A second patient had lost the 'proprioceptive' sense of the integrated reality of her body and had to learn, with difficulty, to rely on the sense of sight to supply as far as possible what was missing. A third patient, who was blind and spastic, had never learnt to recognize things by feel with her hands. 'There was no impairment of elementary sensation as such, but ... she could not identify or recognize anything whatever... . She could not identify – and she did not explore.' Yet almost miraculously, in her sixtieth year, when specifically taught to do so, she grasped the *Gestalt* of a bagel; and thereafter very rapidly she developed a comprehensive ability to recognize all kinds of things with her hands, and also to model heads and figures in clay. It may be significant that the ability to recognize what Polanyi called 'comprehensive entities' appears, according to Dr Sacks, to be a capacity of the right hemisphere rather than the left. See Oliver Sacks, *The Man who Mistook his Wife for a Hat* (Duckworth, 1985, Picador edn, 1986) chapters 1, 3 and 5.

   Mr P would identify a face as a set of features, an 'it'. Thus, in Dr Sacks's words, 'there was formal, but no trace of personal, gnosis'. To my mind the fact that, in spite of his gradually advancing agnosia, Mr P could still understand ideas by enumerating features and could still grasp schematic forms like cubes or hexagons suggests that his underlying capacity to recognize *conceptual* forms was unaffected. Indeed without it I do not think consciousness would ever be possible. My theory of conceptual forms is explained in Chapter 2 and subsequent chapters of this book.

3. The educationist Robin A. Hodgkin distinguishes five types of human competence, the language-like, the musical, the iconic, the enactive and the interpersonal. These all involve the synchronic or serial integration of particulars in different ways and combinations. When it comes to representing the expression of such competences in symbolic terms, however, the representation has, I think, almost always to take either the language-like or the iconic form – as for example with the notation of ballet movements. (I note that Dr Sacks, following Jerome Bruner and ultimately perhaps Lévi-Strauss, distinguishes two 'modes of thought, of organization or of being', the paradigmatic and the narrative.) See Robin A. Hodgkin, *Playing and Exploring: Education through the Discovery of Order* (Methuen, 1985). A similar theory has been presented by Howard Gardner in *Frames of Mind: The Theory of Multiple Intelligences* (Heinemann, 1984).
4. See L. S. Vygotsky, *Thought and Language* (MIT Press, 1962).
5. John Keats, Sonnet 'When I have fears that I may cease to be'.

Chapter 2: Conceptual Forms

1. George Steiner, *Real Presences* (Faber and Faber, 1989) p. 129.
2. Alexander Woodcock and Monte Davis, *Catastrophe Theory* (E. P. Dutton, 1978; Penguin edn 1980) p. 21.
3. There is a fuller discusion of conceptual space and connected ideas in chapters 2 and 3 of Edward Moss, *Seeing Man Whole: A New Model for Psychology* (The Book Guild, 1989; out of print, copies available from the author, 29 Guildown Avenue, Guildford GU2 5HA, UK).
4. A clear account of the matter is given in W. Ross Ashby, *An Introduction to Cybernetics* (Chapman and Hall, 1956; University Paperbacks edn, 1964) pp. 123–4. As Ashby emphasizes, an important implication is that the information conveyed is not an intrinsic property of the individual message; it depends on the set of possibilities concerned, as well as on the particular actuality that resolves it.
5. L. S. Vygotsky, *Thought and Language* (MIT Press, 1962). A summary and critique of Vygotsky's ideas is given in *Seeing Man Whole*, pp. 32–9.
6. R. A. Hodgkin, *Playing and Exploring: Education Through the Discovery of Order* (Methuen, 1985) pp. 155–6.
7. See Erwin Schrödinger, 'Are There Quantum Jumps?' from *What is Life? and Other Scientific Essays* (Doubleday Anchor, 1956) p.137.

Chapter 3: Tacit Integration as a Grammatical Process

1. From *The Wreck of the Deutschland* by Gerard Manley Hopkins.
2. See 'The Magical Number Seven' in George A. Miller, *The Psychology of Communication* (Penguin, 1968).

3. See Gregory Bateson, *Mind and Nature* (Fontana/Collins, 1979) especially chapter IV, pp. 127 ff.
4. George Berkeley, *The Principles of Human Knowledge* (1710) Introduction.
5. Sir Karl Popper and Sir John Eccles, *The Self and its Brain* (Springer International, 1977) p. 21.
6. Michel Foucault, *Les Mots et les Choses* (Gallimard, 1966) p. 97.
7. L. S. Vygotsky, *Thought and Language* (MIT Press, 1962).

Chapter 4: Purpose, Meaning and the Categories of Knowing

1. J. L. Mackie, *Problems from Locke* (Oxford, 1976) chapter 1, reprinted in Ted Honderich (ed.), *Philosophy through its Past* (Penguin, 1984).
2. B. Berlin and P. Kay, *Basic Color Terms: Their Universality and Evolution* (University of California Press, 1969). See also A. E. St G. Moss, 'Does Russian Have a Basic Term for Purple?', *Linguistics*, vol. 29 (1989) pp. 145–55.
3. Richard Rorty, *Philosophy and the Mirror of Nature* (Blackwell, 1980).
4. Immanuel Kant, *Critique of Pure Reason*, trans. Meiklejohn (Bell, 1924): 'Transcendental Logic', ch. II, ii, 11.
5. Immanuel Kant, *Prologomena to Any Future Metaphysics*, trans. Beck (Bobbs Merrill, 1950): section 46, n. 5.
6. Immanuel Kant, *Critique of Pure Reason*: 'Transcendental Dialectic', bk II, ch. I.
7. Nicolas of Cusa, *The Vision of God*, trans. Slater (Frederick Ungar, Atlantic Paperbacks, 1960) pp. 41, 82.
8. Rainer Maria Rilke, *Duino Elegies*, Eighth Elegy:

> Never, not for a single day, do we have
> The pure space before us in which the flowers
> Grow up endlessly. Always it is world
> and never Nowhere without Not.

9. James, J. Gibson, *The Senses Considered as Perceptual Systems* (Allen & Unwin, 1968).

Chapter 5: A Reductionist Theory of Consciousness

1. See in this connexion Robert Nozick, *Philosophical Explanations* (Harvard, 1981) pp. 99–100. Nozick's ideas are quoted and discussed in Edward Moss, *Seeing Man Whole: A New model for Psychology* (The Book Guild, 1989) pp. 331–4.
2. Dennett makes use of the word 'meme', introduced by Richard Dawkins, to refer to these ideas. I regard this coinage as unnecessary and misleading and I prefer to avoid it.

3. Derek Parfit, *Reasons and Persons* (Oxford, 1984). Parfit's argument about persons is discussed in Moss, *Seeing Man Whole*, p. 334n.
4. See Edward Moss, *Seeing Man Whole*, pp. 149–252 and *passim*; also Edward Moss, *Growing into Freedom: A Way to Make Sense of Ourselves* (Eagle, 1993) chapter 3.
5. Immanuel Kant, *Prologomena to Any Future Metaphysics*, trans. Beck (Bobbs Merrill, 1950) section 47.
6. Immanuel Kant, *ibid.*, p. 244.
7. R. Harre' and P. F. Secord, *The Explanation of Social Behaviour* (Blackwell, 1972).
8. Erving Goffman, *The Presentation of the Self in Everyday Life* (1959; Penguin edn, 1971).
9. Robert Nozick, *Philosophical Explanations* (Harvard, 1991) pp. 36–7, 99–100, 104 , 360.

Chapter 6: Ghosts in the Virtual Machine

1. W. Ross Ashby, *An Introduction to Cybernetics* (Chapman & Hall, 1956, University Paperbacks edn, 1964) p. 124.
2. Roger W. Sperry, 'Problems Outstanding in the Evolution of Brain Function' (1964), quoted in Sperry, 'A Mentalist View of Consciousness', *Social Neuroscience Bulletin*, vol. 6, no. 2 (Spring 1993) p. 17.
3. Roger W. Sperry, *ibid.*, 'A Mentalist View of Consciousness', pp. 18, 16.
4. John Searle, *Minds, Brains and Science* (BBC, 1984) pp. 94, 98.
5. Isidor Chein, *The Science of Behaviour and the Image of Man* (Tavistock, 1973) p. 201.
6. Erwin Schrödinger, *What is Life? and other Scientific Essays* (Doubleday Anchor, 1956) pp. 211–13.

Chapter 7: An Evolutionist's Theory of Consciousness

1. Gerald M. Edelman, *Bright Air, Brilliant fire: On the Matter of Mind* (Basic Books, 1992; Allen Lane, The Penguin Press, 1992).
2. I owe this reference to Peirce's concept of 'abduction' to Hodgkin.
3. W.Ross Ashby, *An Introduction to Cybernetics* (Chapman & Hall, 1956; Methuen University Paperbacks ed, 1964) p. 197.
4. For my own ideas on this subject see Chapters 2 and 3 above and Edward Moss, *Seeing Man Whole: A New Model For Psychology* (The Book Guild, 1989) pp. 65–136. They are supported by a monograph *A New Theory of Language*, which is unpublished.
5. Another neuroscientist who is dissatisfied with the cognitive scientists' understanding of qualia is Nicolas Humphrey. His alternative explanation roots the subjective nature of consciousness entirely in the secondary qualities. These he regards as the result of active responses

by the body that in the course of evolution become 'privatised' in an internal world. He asserts accordingly that a person can be conscious without thinking anything, that is, through sensation alone – a statement which I would certainly wish to dispute. *All* perception, as I see it, and not merely the perception of sensory qualities, involves an active response, a point which I believe has been demonstrated by James J. Gibson. Apart from this, may impression is that, in spite of his criticisms of Dennett, Humphrey is still trying in the last resort to offer a reductionist explanation of consciousness and to maintain the position which Dennett takes that 'the mind is the brain'. I have attempted in Chapters 9 and 10 of this book to explain why this position is untenable. We have to start, in a Polanyian way, from the irreducible *complexity* of consciousness. See Nicholas Humphrey, 'The Private World of Consciousness', *New Scientist*, vol. 141, 1907 (January 1994); Nicholas Humphrey, *A History of Mind* (Vintage, 1993).

6. L. S. Vygotsky, *Thought and Language* (MIT Press, 1962). A summary is given in *Seeing Man Whole* pp. 32–9.

Chapter 8: Reflections on Edelman

1. Steven Rose, *The Conscious Brain* (Penguin, 1976) p.135.
2. Erwin Schrodinger, *'Are there Quantum Jumps?'* from *What is Life? and Other Scientific Essays* (Doubleday Anchor, 1956) p. 137.

Chapter 9: Knowing and Reality

1. John C. Puddefoot, *Resonance Realism* (forthcoming). See also his *Logic and Affirmation: Perspectives in Mathematics and Theology* (Scottish Academic Press, 1987).
2. Robbin A. Hodgkin offers a convincing and thought-provoking analysis of learning and discovery on the frontier of a person's 'potential space' in his *Playing and Exploring: Education Through the Discovery of Order* (Methuen, 1985).
3. Rom Harre, *Physical Properties* (forthcoming in a volume to honour Richard Swinburne).
4. Thomas F. Torrance has written extensively and authoritatively in this field. His *Reality and Scientific Theology* (Scottish Academic Press, 1985) has been of particular value to me. From a different angle the moral philosopher Alasdair MacIntyre has come to a position reminiscent of Polanyi's in arguing the need for truth to be asserted from within a tradition, while setting his face strongly against relativism. 'To be outside all traditions is to be in a state of intellectual and moral destitution.' See Alasdair MacIntyre, *Whose Justice? Which Rationality?* (Duckworth, 1988) pp. 363–7.
5. George Steiner, *Real Presences* (Faber & Faber, 1989) p. 105.
6. Rom Harre, op. cit., *Physical Properties*.

7. See Jonathan Culler, *Saussure* (Fontana, 1976) p. 86.
8. Malcolm Bowie, *Lacan* (Fontana, 1981) p. 87.
9. George Steiner, *Real Presences*, p. 214.
10. Thomas F. Torrance, *The Transfinite Significance of Beauty in Science and Theology* (forthcoming).
11. Of. Nicholas Lash's comment, in the context of a discussion of the theology of Karl Rahner, that: 'The simpleness or oneness of God ... is not *graspable* by us. It lies on the other side of all the complications in the world, and it is *in* those complications that we ... have to live' (Nicholas Lash, *Easter in Ordinary* (SCM Press, 1988) p. 235).
12. Colossians 1: 17.

Chapter 10: The Here add Now

1. I am more impressed by the compatibilities and similarities between Popper and Polanyi than by the differences.
2. Popper's Worlds 1, 2 and 3 are discussed in Edward Moss *Seeing Man Whole: A New Model for Psychology* (The Book Guild, 1989) pp. 349–53.
3. I am not of course implying that the self can, in a wider context, be reduced to the transcendental subject of thought.
4. The importance of the distinction between the I–you and the I–it relationships is central to the thought of Martin Buber, and in particular to his book *I and Thou* (T. & T. Clark, 1970). Buber's distinction is interestingly discussed in Nicholas Lash, *Easter in Ordinary* (SCM Press, 1988) chapter 14.
5. Erwin Schrodinger, *What is Life? and Other Scientific Essays* (Doubleday Anchor, 1956) p. 211.
6. Sir Alfred Ayer, *Construction of our Theory of the Physical World* (1973) reprinted in Ted Honderich and Miles Burnyeat (eds) *Philosophy As It Is* (Penguin, 1979).

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Note: Figures in **bold print** indicate pages on which explanations or definitions are provided of words given a specialized meaning in the text.

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